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Agriculture.

HOW TO GROW AN ACRE OF CORN.

The premier corn (maize) growing country of the world is undoubtedly the United States of America. There, the breeding of corn has been elevated to an exact science. Corn clubs had their origin in that country, and no expense is spared to teach the farmers the most up-to-date methods of corngrowing in order to enable them to obtain the highest returns. Now that, as we hope, many farmers' sons throughout Queensland will seize the opportunity afforded them by the Department of Agriculture and Stock to prove their ability to raise profitable crops of corn, we wish to draw the attention of young men on the land to the terms of the proposed competition as published in the September issue of the journal. The prizes to be awarded will be of the value of £5, £2, and £1 with three special prizes of the value of £10, £5, and £3, to the competitors who stand first, second, and third in the entire competition.

With a view to assisting competitors in this matter, we publish in this issue of the Journal a most valuable Bulletin issued by the United States Department of Agriculture, written by C. P. Hartley, Physiologist in Charge of Corn Investigations, under the above caption. If competitors will study the directions therein given, they will—given good conditions of soil, rainfall, &c.—run each other very close in this very important competition.

INTRODUCTION.

For no ten-year period has the corn yield of the United States exceeded 28 bushels per acre. No State has averaged for any year over 54 bushels per acre, yet in practically every section of the United States yields of more than 100 bushels have been produced. As States and as a nation twice as much land is being used and much more labour is being performed in producing the corn crop than is necessary.

The possibility of doubling our acre yield of corn is so certain and its accomplishment of such tremendous importance that school, State, national, and independent organisations of corn clubs and associations of cornbreeders and corngrowers are helping in a way that will lead to success. Such clubs and associations are especially fitted for this most important work, for they combine the yearly experience of many and can continue their records indefinitely, each year profiting by past experiences.

In the following pages some fundamental requirements for large and profitable corn yields on 1 acre are given for the general guidance of boys, either as individuals or as members of clubs and associations. Exceptional and local conditions are not here discussed. General and fundamental requirements of the crop as gained by experiences in many parts of the United States are given as a foundation upon which to utilise and apply local experience and instructions from those possessing such experience.

WHAT KIND OF CORN TO GROW.

Grow the kind that is likely to prove most profitable.

If near a good market for roasting ears or a canning factory sweet corn may prove most profitable, or under certain conditions pop corn might pay best.

For some sections varieties of the dent-corn group are too soft to resist decay and varieties of the flint-corn group are more profitable.

In practically every corngrowing community there is a strong demand every spring for first-class seed corn.

The acre can be made highly profitable if devoted to the growing of seed corn of the most productive variety for the neighbourhood. If the crop is sold as commercial corn, 50 or 75 cents a bushel will be received, but by selecting at the proper time all that is suitable for seed and giving it good care till planting time 2 dollars or 3 dollars a bushel can be obtained.

The variety that has generally produced the most good, sound grain in the neighbourhood is the variety to plant, and it can be greatly improved by careful seed selection. It is also the corn that will be most in demand for seed throughout the neighbourhood.

If corn throughout the county generally fails to ripen properly, take up work with an earlier maturing variety.

If the corn generally grows too tall take up work with seed from stalks that do not grow too tall.

If the most productive varieties of the neighbourhood are prolific varieties, take up work with the one that seems to have been giving most general satisfaction.

If the most productive varieties of the neighbourhood are one-eared varieties, take up work with the one that seems to have been giving most general satisfaction.

WHEN TO TAKE UP CORN-IMPROVEMENT WORK.

Just as soon as you reach a determination to persevere until successful you should begin corn-improvement work.

Each community needs an experienced and conscientious corn-breeder.

By starting while young and keeping at it, boys have splendid opportunities to produce better varieties than have ever been produced.

The Office of Corn Investigations of the United States Department of Agriculture wants to help a boy in each county who has produced the best corn crop for a number of years to become an efficient, conscientious seed-corn grower for his county.

Some feature or other of the work needs attention at all seasons of the year.

These features must be attended to at the proper time, as success is not likely to be won by spasmodic attempts. It is usually won by perseverance, which causes each operation to be accomplished at the proper time and in the best manner.

At planting time hopes of success are usually brightest, but the exercise of ability at seed-selecting time, at ploughing time, and at many other times is necessary.

SELECTING SEED FOR THE ACRE.

Select seed ears in the field from the very best stalks and as soon as the ears are ripe. (See "Drying and Caring for Seed-corn.")

Select at least 100 ears; 200 are much better, and it is still better if some ears of the same variety be selected from a neighbouring field or farm.

The acre is to be a seed-patch, and the improvement of a variety of corn should not begin with a small number of ears, as close breeding is likely to gradually reduce productiveness.

PREPARING THE SEED FOR PLANTING.

Such work as sorting, testing germinating qualities, shelling, &c., should be done in the early spring before field work demands attention.

The best time to grade seed-corn is before shelling.

Only heavy, solid ears should be used for seed, and the ears chosen should contain kernels of a good uniform length, width, and thickness.

Ears containing kernels of various sizes and shapes should be discarded.

The ears can be numbered by sticking a pin through a piece of paper into the end of the cob, and ten kernels taken from each ear can then

be tested to determine whether they will grow. If weak or dead kernels are found, the ears from which they were taken should be discarded.

Before shelling, all small and poorly developed kernels should be removed from the ears, for they will produce weak and barren stalks.

If the seed is to be planted by means of a corn-planter, the large, irregular kernels from the butts of the ears should also be discarded before the ears are shelled.

The proper way to shell seed-corn is by hand, shelling one ear at a time into a coarse-meshed sieve. This enables the kernels and cob from each ear to be closely inspected and all kernels to be easily rejected if any defect is found. The sieve facilitates the separation of the chaff and other small particles from the seed.

SELECTING AN ACRE FOR CORN.

It is better to have the seed-acre adjacent to or a part of a larger field of the same variety of corn.

An isolated acre of corn is very likely to meet with injury from live stock, squirrels, crows, chinch bugs, or grasshoppers at some time during the season.

The soil should be fertile and loose to a great depth. A good corn crop cannot be produced on hard, depleted soil.

A highly profitable corn crop depends very largely upon the selection of a fertile, well-drained location.

The acre should be uniform, so that all parts will be in proper condition for cultivation at the same time.

The nature of the season cannot be foretold; therefore it is impossible to predict whether high land or low land will produce better, but as corn makes a fall, thrifty growth, requiring much moisture, low land usually being better supplied with moisture and fertility is likely, if well drained, to produce better than high land.

Choose land that usually produces heavy crops and, if possible, land that has recently produced vigorous crops of clover, cowpeas, alfalfa, vetch, or some other legume. A heavy growth of large, vigorous horseweeds, cocklebur, or other rank-growing weeds indicates a good corn soil.

Alfalfa, clover, and similar plants send their roots to great depths and are the best crops to turn under for the purpose of growing a very large corn crop. Their culture is the best and most economical way of subsoiling land. The deep-growing roots loosen the subsoil and keep it porous long after the crop is turned under. Without sufficient rainfall unusually poor corn crops are obtained on alfalfa sod, the soil moisture having been exhausted to a great depth by the roots of the alfalfa.

Outer rows of corn are usually broken down in cultivating and are usually injured more by chinch bugs or grasshoppers from adjacent fields or by hot winds. Therefore, more than an acre should be planted, so that at least four guard rows of corn may surround the test acre.

FERTILISING THE ACRE.

A liberal supply of soil moisture is indispensable to a good corn yield.

Well-decomposed manure is the surest fertiliser for producing a large corn crop.

Failure is quite sure to follow an attempt to grow a large corn crop on hard or depleted soil unless its hard or depleted condition is overcome by a liberal application of manure.

Barnyard manure that is well decomposed and moist can safely be applied abundantly, 20 or 40 tons to the acre.

Where rainfall is deficient, manure containing stalks or undecomposed straw may reduce the corn yield by admitting too much air into the soil and facilitating the escape of soil moisture.

Manure and decomposed vegetable matter greatly increase the water-absorbing and water-holding capacity of a soil.

Where heavy applications are made, the manure should be well mixed with the soil, and preferably this should be done several months previous to planting the corn.

Manure should be applied before its soluble parts have leached away by exposure to rain.

It is unwise to attempt to grow a profitable corn crop on hard, depleted soil by a heavy application of commercial fertilisers without improving the physical condition of the soil.

If local tests have demonstrated that a soil responds with increased yields to the application of a particular element, that element should be liberally applied.

Many soils contain an abundance of potassium, but some soils, notably some peaty soils, are so deficient in this element that they yield very unprofitable corn crops without its application and very profitable corn crops when potassium is supplied.

Some heavy clay soils and sandy soils are often improved by an application of lime, and in many localities ground phosphate rock can be profitably used in growing corn. The lime is applied to best advantage for the clover or alfalfa crop. The ground phosphate rock is best applied by composting it with manure.

Large corn crops have been grown by heavy applications of commercial fertilisers containing nitrogen, phosphorus, and potassium, but on many soils the application of all these elements is unnecessary, and the application of those not needed increases the cost of production and does not increase the yield. Nitrogen, the most expensive element of commercial fertilisers, is taken from the air and stored in the soil by the growing of legumes.

Commercial fertilisers should be applied broadcast. The corn roots ramify throughout the soil and utilise fertilisers so applied to better advantage than when they are applied directly in the row or hill.

If 300 lb. or more per acre of commercial fertilisers be placed in direct contact with the kernels, they are liable to be killed or so injured that the yield may be reduced.

PREPARATION OF THE SEED-BED.

Land is ploughed in order to loosen it and enable water to enter in greater quantity, be absorbed to greater depth, and remain longer in the soil.

A deep seed-bed well supplied with soil moisture and well drained makes a big corn yield possible whether the summer proves "too dry" or "too wet."

If not well ploughed, some lands are so impervious that during several weeks of rainy weather they remain dry below a depth of 5 or 10 in.

In many localities it is best to plough in the fall or several months before planting, in order to enable the soil to store a sufficient amount of water to produce a corn crop. In some localities it is necessary to grow rye or some other crop on fall-ploughed land to prevent erosion.

Heavy cover crops should be turned under in the fall, winter, or very early spring in order to give time for decay before corn is planted on the land.

Land should never be ploughed when too wet to pulverise finely. In the fall, ploughing may be done even when the ground is too dry, as winter rains and freezing will pulverise the clods.

If ploughing is done in the spring shortly before planting time, it is necessary that the soil be in proper condition to pulverise readily.

Spring-ploughed land should be harrowed the same day it is ploughed.

Discing land in the spring before ploughing is a great advantage. It retains moisture and keeps the land longer in a good ploughing condition. It also pulverises the surface portion of the furrow-slice before it is turned under out of reach of the harrow.

When the soil is loose to a sufficient depth, corn roots penetrate in abundance to a depth of 3 or 4 ft.

The growing of clover and deep-rooted plants is profitably practised with most soils, and subsoiling is profitably practised with some soils to increase their water-absorbing capacity and to enable the corn roots to use the soil to greater depths.

By growing deep-rooted crops, or by some other means, the soil should be loosened to a great depth. As the crop on an acre is limited to 43,560 square feet of surface, it should be enabled to use the acre to a great depth. In compact soils ploughed but 6 in. deep and cultivated 3 in. deep there remains but 3 in. of loose, ploughed soil in which the corn roots can feed unmolested by summer cultivation, but if ploughed 10 in. deep and similarly cultivated there remains more than twice as much loose, unmolested soil for the corn roots.

There are good disc ploughs, there are good walking mouldboard ploughs, and there are good sulky mouldboard ploughs.

Poor ploughing can be done with a good plough.

Use large ploughs and plenty of power.

On many heavy clay soils the yield of corn per acre depends largely upon the thoroughness of the ploughing.

Loosen all the land and leave no large air spaces. Do not "cut and cover."

A pasture field was ploughed in alternate strips by two men, one a careful ploughman and the other a poor ploughman. The poorly ploughed strips showed poorer corn all through the summer and produced 20 bushels less corn to the acre than the well-ploughed strips. The careless ploughman allowed the plough to "cut and cover" in places, leaving hard spots where the plough did not loosen the land and large air spaces where the overturned sod buckled and did not come in contact with the subsoil. Hills of corn growing on hard spots or over large air spaces usually produce poorly.

Where a heavy growth of clover or weeds or a heavy application of manure was ploughed under in the fall, the land should be given, just previous to planting, a cultivation as deep as it was ploughed. This deep cultivation mixes the humus throughout the soil and is of more value than any other cultivation the corn crop can be given. It is economical, because wider cultivators and more horses can be employed than is possible after the corn is planted.

PLANTING.

There are many questions concerning implements, methods, distance between rows, thickness of planting, &c., that should be definitely settled before planting time. These questions are governed to a large degree by local conditions.

A distance of 3·3 ft. between corn rows is suggested for the majority of cases. Some two-row planters are more easily adjusted to 3 ft. 4 in., which is very satisfactory.

More space is required for tall-growing than for smaller varieties.

It is never advisable to use seed that germinates poorly, and with first-class seed it is well to drop twice as many kernels as the number of stalks desired.

In planting, this familiar saying should be followed: "One for the blackbird, one for the crow, one for the cutworm, and three for to grow."

On poor land and also in very dry sections larger grain yields can be secured with a thin stand of stalks. Under such conditions, however, some other crop can usually be grown more profitably than corn, for corn requires much moisture and fertility.

In sections where the annual rainfall is less than 25 in. a thin stand of stalks is preferable unless moisture is supplied from some other source than rain.

Where soil moisture is likely to be deficient during the silking period, a stalk for each 20 in. of row (the rows being 3·3 ft. apart) is sufficient and will make possible a yield of 113 bushels per acre if the stalks average 1 lb. of grain each.

With an abundance of fertility and rainfall 12,000 or more stalks to the acre are necessary for obtaining record yields.

With an abundance of fertility and soil moisture throughout the silking period, a stalk for each 12 in. of row is advisable and will make possible a yield of 188 bushels per acre, the stalks averaging 1 lb. of grain each.

Drilled corn, if kept equally well cultivated and free from weeds, will usually produce better than hill-planted corn. The stalks develop better and yield better when separated from each other by several inches than when crowded closely together in hills.

If the acre is planted in hills by hand the kernels should be separated in each hill by several inches. This tends to increase the yield and makes it easier to thin without loosening or injuring the remaining stalks.

In the proper kind of seed-bed the kernels should be covered 1 in. deep. They should come in contact with moist soil. They cannot germinate in dry soil, and are liable to injury before rain occurs.

A successful planting, a satisfactory stand of plants, and a profitable yield are largely assured by getting the seed-bed in a perfect condition for very early planting and then waiting to plant until the soil is warm and moist.

The best possible yield necessitates the proper number of stalks evenly distributed. But this alone is not sufficient. Quality of stalks is as necessary as quantity of stalks. The proper number of stalks can be obtained by heavy planting of poor seed, but stalks from such seed will not produce well. The quality of a stalk is determined by the seed and the conditions for good production with which it is provided.

The secret of a prize-winning corn-crop consists in having the proper stand of stalks, each one of which yields well. This can be best accomplished by the heavy planting of good seed and thinning out the poorest plants.

Replanting seldom increases the grain yield.

Cultivating up the first planting and planting the entire acre the second time is better than replanting a poor stand.

COMBATING CUTWORMS.

In many sections it is seldom possible to plant corn at the proper season without having a large percentage of the young plants destroyed by cutworms.

Fall ploughing and late spring planting are methods successfully used to combat cutworms.

A persevering boy can prevent his acre from being seriously injured by cutworms by placing upon each corn-hill, immediately after planting, and later on at intervals, lumps of poisoned bait, made by mixing about 50 lb. of wheat bran with 1 lb. of Paris green* and enough of the cheapest grade of molasses to make a stiff dough. Many of the worms eat this poisoned bait and die before the corn comes up, but this method of

* Paris green is a poison, and should not be placed where children or domestic animals can get it.

treatment has also proved quite effective even after the plants are well grown. Corn meal may be substituted for the wheat bran in the mixture when the latter is not available.

THINNING.

For highly profitable crops, heavy planting and thinning are advisable, though not always practicable in extensive planting. It is one means a boy has of producing a record-breaking acre of corn.

Thinning should be performed as soon as the stalks are too hard for cutworms to cut off and before they are a foot tall.

A flattened broomstick or a similar stick to which is fastened a flattened piece of iron, like a 2-in. chisel, is of great assistance in thinning, as it is necessary to remove the stalks below the surface of the ground in order to prevent further growth.

Slightly more stalks than a perfect stand should be retained, so that injured, diseased, or feeble stalks can be removed later without reducing the stand below that required for the best grain yield. Such stalks should be considered as weeds and removed as soon as their inferiority is evident.

CULTIVATION.

To produce a maximum yield, corn roots require warmth, a certain amount of air, and considerable moisture.

Corn is cultivated in order to supply these requirements.

Too much water and too little air in the soil as surely prevent healthy growth as too much air and too little water.

Air is deficient in saturated soils, and on such soils corn plants become yellow and unproductive.

Good cultivation at the proper time admits air, lessens the ascent of water from the subsoil, causes the soil to become warmer, and stimulates a better growth.

Weeds should be killed as soon as they begin to grow, but the primary reason for cultivating is to maintain the proper proportion of air and moisture in the soil.

Some successful corngrowers—some who have averaged 100 bushels of dry-shelled corn to the acre on hundreds of acres—believe the best single cultivation they can give their corn is a cultivation 8 or 10 in. deep given just before planting.

If prolonged and heavy rains pack the soil to a great depth, a deep cultivation can sometimes be given to advantage while the corn is less than a foot tall.

Soon after the plants become a foot tall their roots reach across the spaces between rows, and cultivation should not be deeper than 2 in. A deeper cultivation is likely to reduce the yield.

A shallow cultivation should be given as soon after every heavy rain as the land becomes in good workable condition. The cultivation should be given with such implements and in such a manner as to leave the soil in a fine, loose, smooth condition.

It is never safe to allow the soil surface to become hard and too dry to cultivate to the best advantage. Continued dry weather with the soil in this condition is certain to reduce the yield materially, and cultivating such soil results in still greater injury.

Until the silking period the soil surface should be kept in a fine, loose condition, so that in walking on it when dry it is felt to give under the feet and distinct footprints are made.

Shallow cultivations given even as late as silking time are often as valuable as earlier cultivations.

Weeds growing in the corn at silking time reduce yields very materially, as has been conclusively proved by experiments conducted by the Office of Corn Investigations.

Under some conditions six or eight cultivations are advisable, while under other conditions three cultivations may be sufficient to keep the soil in proper condition and would therefore prove more profitable than a greater number.

SELECTING SEED FROM THE ACRE.

It is reasonable to assume that a variety that makes the best yields in a county is adapted to the locality. This is especially true if the same variety produces best for several years.

Well-preserved seed of such varieties is greatly needed and is in demand in practically all corngrowing counties.

It is also fair to assume that seed from a high-yielding acre, if well cared for during the winter, will under similar conditions give equally good yields on many other acres in the neighbourhood, and that with better care even greater yields may be obtained.

All good seed-ears should be gathered as soon as ripe and before any freezing has occurred.

Go through the acre with a picking bag on the shoulder and gather the ears from the best stalks. By walking between two corn-rows the good high-yielding plants in the two rows can be readily found.

The kind of plant from which seed should be taken is one that produces much better without any apparent reason than plants surrounding it. Plants with an unusual amount of space or an unusually fertile location may produce better than surrounding plants without possessing any greater inherent producing power, and therefore would be of no special value as plants from which to select seed.

In the Central and Southern States, where there is a tendency for stalks to grow too tall, short thick stalks producing pendant ears at or below their middle point are good stalks. From local varieties low-growing strains can be bred by selecting seed each year from high-yielding but low-growing stalks.

Where exceedingly early-maturing varieties are necessary, seed should be taken from stalks that produced their ears high enough to keep the ears from touching the ground when they become pendant.

Suckers are undesirable and can be gradually eliminated by taking seed only from stalks that produce no suckers.

In prolific varieties—*i.e.*, varieties bearing two or more ears per stalk—the various ears of a stalk are of equal value for seed.

When an unusually high-yielding and well-proportioned plant is found, the ear or ears should be cut with some of the husk attached, so that such ears can later be distinguished and used in planting the seed-acre the next year.

The seed-acre of one year must not supply the entire quantity of seed for the seed-acre the next year. A continuation of such a practice would tend to reduce the productivity of the variety because of close breeding.

To avoid close breeding, some ears from unusually good plants from other fields of the same variety should be planted each year in the seed-acre.

DRYING AND CARING FOR SEED-CORN.

Immediately after gathering, the seed-ears should be placed to dry in a position where they will not touch each other and where there is a good circulation of air.

Binder twine or racks made from electrically welded wire fencing are satisfactory means of suspending seed-ears to dry.

In many Southern States it is not desirable to leave the ears on the racks all winter, as they are likely to be injured by the grain moth.

When the seed becomes as dry as old corn, it can be taken from the racks, weighed, and stored where neither moisture, moths, nor mice can injure it.

Upon care in this particular depends in a large measure the success of the next year's crop. Poor care has reduced and will reduce the yielding power of seed by 18 bushels per acre without perceptibly injuring its germination.

An upstairs room or an attic usually offers good protection from moisture.

A pound of naphthalene or moth balls stored with each bushel of seed-ears will protect it from grain moths and do it no injury.

Boxes or crates completely covered with fly screening or woven wire will give protection from mice and rats.

Perhaps no other regrets are so often heard at boys' corn-club meetings as those regarding the destruction of their seed-corn by mice and rats.

If seed-corn be placed where it is merely supposed that mice or rats cannot injure it, the owner is likely to meet disappointment.

There are so many unavoidable things that may cause poor yields that it becomes necessary to insure success in every way possible. The only way to insure the seed supply is to place it where it cannot be injured by anything.

DETERMINING THE YIELD.

A record of a big yield to be of value must be honestly and accurately determined according to standard methods of measurement.

It is easy to weigh the corn when it is full of water and to measure a smaller area than that which produced the crop, but to do so makes the weighing and measuring a mockery and the record of no value.

Green, sappy ears may weigh twice as much as when dry.

A plat consisting of four corn-rows 4,400 ft. long and 3·3 ft. apart occupies 1 acre if measured from one outside row to the other, but by correct measurement it occupies $1\frac{1}{3}$ acre of land.

The number of rows must be multiplied by the average width between rows and this product multiplied by the full length of the plat to obtain the true area from which the corn received benefit.

To make the records of value and have them comparable from year to year it is necessary to consider the moisture in the corn when harvested and weighed. To accomplish this, 100 lb. of ears should be weighed when harvested, put in an airy place till as dry as old corn, and then weighed again and shelled. The weight of shelled corn is the percentage of dry-shelled corn, and multiplying the total pounds harvested by this percentage gives the yield in pounds of dry-shelled corn.

If the acre was harvested directly after the seed was selected, the harvest weights of all can be reduced to pounds of dry-shelled grain by the one calculation. But if the seed was selected while in a sappier condition, a similar process is necessary to determine the pounds of dry-shelled grain taken from the acre for seed.

CONCLUSION.

The praiseworthy and highly beneficial co-operative corn-improvement work in progress throughout the United States is making it more urgent that records be kept and that they be kept in definite and comparable terms.

Dry-shelled corn per acre is the most definite and generally accepted way of recording corn yields. Old corn, or corn containing approximately 12 per cent. of moisture, is considered dry corn. Fifty-six pounds of shelled corn constitute a bushel.

True records will point the way to further improvement. Knowledge of the requirements of the corn-plant and of the best practicable means of supplying such requirements is of great and general value to the people of the United States. Our weakest defence is our vast acreage of poor corn, the culture of which is impoverishing farms and farmers.

The possibility of doubling the acre yield of corn has been demonstrated in many and remote sections of the United States. A persistent loyal adherence of all corn-improvement workers to the motto "Fewer acres and more corn to the acre" is certain to gradually raise the average yield of county, State, and nation.

OBSERVATIONS OF A TEXAN ON QUEENSLAND.

Many of our readers will remember that in May last an American cotton-grower and ginnery owner from Texas, U.S.A., Mr. E. E. Wood, came to Queensland with the object of ascertaining the capabilities of the State as a stock-raising country, and particularly as a field for the cotton-growing industry. Mr. Wood, during his stay, visited much of the Western country as far as Dulacca, the Southern border at Texas, Inglewood, and Goondiwindi, and the Central districts as far as Barcaldine. He was so impressed with the magnificent opportunities afforded in these districts for the profitable investment in many industries that he announced his intention of returning within the year to settle here, and to bring several of his compatriots with him. Since his return to Texas he has missed no opportunity of advertising our State both by word of mouth and by articles in the Texan Press. The following appeared in the "Childress Post," Texas, of 15th July. There are a few inaccuracies of little moment, such as, for instance, the eucalyptus shedding its leaves, and not its bark, and the absence of improved farming machinery amongst the farmers:—

"After visiting three days in Sydney I took the train to Brisbane, and I could not have been better treated at home than by the Queenslanders. This is a stock-farming State, with the farming left out. Horses, dairy cattle, stock, cattle, and sheep were rolling fat on the natural grasses.

"In but few places of 2,000 miles travelled did I see enough real farming to supply what ought to be produced at home, relying in most places on the natural grasses—the Darling Downs and Lockyer district being exceptions to the rule. There we saw broad meadows of alfalfa, wheatfields, and small patches of corn, sorghum, and millet. Dairying is a growing industry, and here they outshine us by co-operatively owning creameries, bacon factories, mercantile establishments, &c., which is lately encouraged by the Government.

"After mining and stock-raising, dairying is the next most important industry, and they certainly know how to handle it to get the most out of it. The co-operative factories have co-operative selling agencies in London; also in San Francisco. Upon the opening of the Panama Canal they intend to invade the Mississippi Valley and the Atlantic coast with their butter, which is marketed with less cost between the producer and consumer than is known in this country. The dairyman gets from 18 cents to 22 cents per lb. for cream and return of profits out of the creamery.

"Wheat-raising is very successful, the land being broken, sown, and harvested in an up-to-date manner; but the marketing of the crop is crude, being handled in bushel jute bags on the cars and off and on the ship by hand labour. There is not an elevator in the entire country.

"Most Americans who have gone to Australia have made good, a number of whom are directing heads of large concerns—mines, factories, packeries, and railways. Australia being an undeveloped country calls for the push and enterprise that has put this country to the front, and the Government is now offering special inducements to Yankee farmers

to go there. Australian labour is the best paid of any in the world, and the per capita wealth is the greatest.

"Wool is to that country just what cotton is to this, over 100,000,000 dollars being the annual return of the wool clip. This is handled, packed, and marketed in a superior manner to the way we do it.

"Fat cattle for market is a large and growing industry. Shorthorns is the favourite breed. I saw several bunches of steers that would dress 700 to 1,000 lb. Such a thing as topping off cattle for market has not occurred to them.

"Fly-screens are noticeable by their absence, and cornbread and buttermilk are good for pigs only.

"The Australian worker is ultra-conservative. His time-honoured way is right, and if you want it done any other way he will quit.

"This is a land of good solid fences without a fence staple. All posts are bored, and the wire drawn through the holes. Nails are not extravagantly used, most carpenter's work being mortised and tenoned. The eucalyptus family of trees (of which there are many varieties) is the prevailing timber. Nearly all kinds are hard and durable. The presence of the eucalyptus accounts for the absence of malaria; it sheds its leaves, but not its bark. The healthfulness of the country is equal to West Texas. Two-wheeled carts and carriages are the prevailing type of vehicles.

"The cultivation of row-crops is a big undertaking for an Australian farmer, 20 acres being thought a big job for one man. Improved planters and cultivators of the American type are scarce. Corn is successfully raised in most districts, considering the tools they have to work with. Sugar-cane is a large industry in the Central district. Cotton-growing is not extensively engaged in, though it thrives and grows perennially in all parts of Queensland. The planting, cultivating, and gathering of cotton is not grasped by them, though they have the ambition of becoming one of the large cotton countries of the world, all of which they can be by proper effort. All kinds of fruits and flowering shrubs grow to perfection. Citrus fruits are especially adapted to this country. Their skinned fruits are subject to injury by a fruit-fly.

"Queensland boasts of the richest gold mine in the world, this being Mount Morgan, which has returned 40,000,000 dollars in dividends. An American is manager. There are many other mines of copper, gold, tungsten, and coal and other minerals. Precious gems of different varieties are found also.

"Rabbits, descendants of three pairs of Kentucky cotton-tails, are a great pest to the Southern part of the continent, and are prevented from spreading over the whole area by a rabbit-proof fence, and guards are kept to see that none get through. The prickly pear is also an imported pest that is fast spreading over the land, and there seems no remedy but by settling up the land. It has a liking for the richest lands, and these lands can be acquired from the Government at a low price, the

main consideration being to rid the land of the pear in a given time. In some places a bounty is paid.

"Living expenses are not as high there as here, but building material and machinery are 20 to 40 per cent. higher.

"Queensland schoolhouses in the country are superior to the average Texas rural schoolhouse, and from a casual inspection we would say that their rural schools are better than ours. The town and city schools are not up to the latest practice with us, and their school literature is not written in as attractive a style as ours. Queensland State University has been established two years, and is the only institution in the State of higher education. There are numerous high schools and agricultural schools. Schools are maintained out of the general revenue of the State, and not by local tax levy, as with us.

"Public utilities, with few exceptions, are operated by the State, and their telephones, telegraph system, and railroads appear to be more satisfactory than ours, and telegraph rates are one-half the rates here.

"Nearly all the latest ideas in government are being worked out in Australia. Old age pensions, mothers' bounties, minimum wage and eight-hour day, Government aid to buy homes and farms, advances to farmers at 5 per cent. to improve or equip farms, with twenty years to repay, being some of the ideas they are trying out. The latest idea agitated for adoption is to make all railroads absolutely free of charge, and support them out of revenues from the State, thereby putting all parts of the State on an equal footing with its products.

"The invasion of the country by the American Meat Trust is causing quite a stir among the consumers. Stockmen are well satisfied, as cattle have advanced nearly 10 dollars per head since the coming of the trust.

"Americans have invested about 2,000,000 dollars in the only up-to-date packing-house on the continent, and have also invested largely in ranch properties.

"Australians feel the kinship of Great Britain strong, but his brother Yankee more nearly represents the ideals for which they are striving, and the friendship is growing stronger as time goes on.

"Wild animals native to Australia are principally of the marsupial family, some of which are the kangaroo, wallaby, wombat, and opossum. The animals are not vicious, all animals appearing to be tamer than they are here. Wild ducks, geese, turkeys, cockatoos, and emus are some of their birds. There are said to be a good many snakes, but we did not see any.

"The Australian can be depended upon to describe his country to an American in a way that would lead one to believe it was 'not too bad' or 'could be worse.' They are very conservative in all their statements.

"The Queensland 'desert' is a slope of country about 100 miles wide, with open timber on it, and is covered with grass from 1 to 3 ft. high, and underlaid with water from 15 to 100 ft. in depth."

WHAT KIND OF MANURE SHOULD I USE?

By J. C. BRÜNNICH, Agricultural Chemist.

A good many years ago, in an early number of this Journal, I wrote a short article on the same question. Since that time the inquiries, made by farmers with regard to the application of fertilisers, are becoming more frequent, as the fact becomes apparent to the observant agriculturist that both quantity and quality of crops in many instances, particularly on old lands, show a distinct falling off.

The question, "*What kind of manure should I use?*" is generally followed by the question: "*Has manure to be applied every year?*"

A short consideration of the fact, that large amounts of plant-foods are removed by crops from the soil every season, makes it quite clear that the small amount of fertiliser, applied with the crop, is completely used up, and has to be made up again in one form or another for every succeeding crop.

No one can have a conception of the value of the **constituents removed from the soil,** unless by going into figures. A short calculation based on last year's crops, as given by the Government Statistician, will be of general interest, and throw some light on this matter. In the following calculation only such fertilising constituents actually removed in the grain, tubers, and crushable sugar-cane are taken into calculation, and far larger amounts are really contained in straw, stubble, cane tops, and may largely be lost by unsuitable methods of treatment.

1913 Crop.	Potash.	Removed Tons of— Phosphoric Acid.	Nitrogen.
1,769,432 bushels Wheat ..	264	448	1,145
3,915,376 ,, Maize ..	420	900	1,990
115,975 ,, Barley ..	26	16	52
16,548 tons Potatoes ..	20	76	53
2,085,600 ,, Sugar Cane ..	2,235	1,180	1,210
Total	2,965	2,620	4,450
corresponding to tons ..	5,700	14,550	37,000
	Sulphate of Potash.	Superphosphate.	Dried Blood.
of a market value of ..	£80,000	72,750	333,000

We learn that in this manner last year constituents to the value of nearly £500,000 were taken away from the soil.

The actual quantities of artificial fertilisers used in Queensland can unfortunately not be ascertained, but will no doubt represent only a very small fraction of the required amounts. The only figures available refer to oversea export and import, and disclose the extraordinary fact, that with all the great need for artificial fertilisers, last year 2,756 tons of fertilisers (chiefly meatworks manure, dried blood, &c.), at a value of £15,686, were exported, and only 394 tons of fertiliser, of a value of £4,835, were imported.

It is therefore quite evident that most of our farmers are drawing largely on the capital value of their land, which must lead to gradual deterioration and final abandonment of their holding, and is based on the economically unsound reason frequently put forward: "*Why should*

I fertilise, when I can get virgin land at a less value than the cost of fertiliser, recommended to be applied per acre?''

The general adoption of a system of cultivation, based on such an argument, would be disastrous to the State. In the United States of America a similar policy, which had been practised in a few localities, is the cause that some millions of acres of originally high-class agricultural lands have become practically sterile, whereas in European countries, although the soil has been under cultivation for hundreds of years, with proper treatment and fertilising the fertility of the soil has not only been maintained, but the yield of crops has actually been steadily increased, in some cases nearly doubled.

The gospel of **thorough cultivation** combined with the **use of fertilisers** is preached by every officer of the Agricultural Department, and is making slow but sure progress. In a great many instances most gratifying results have been obtained by farmers who have followed our advice, and such farms are always a valuable object lesson to the whole neighbourhood.

In cane cultivation a fairly large amount of artificial fertilisers are used, and generally **complete fertilisers,** or such fertilisers containing the most suitable proportion of fertilising constituents—phosphoric acid, potash, and nitrogen—are applied.

In fruit culture artificial fertilisers are also being used, but in this case as in other general farming the inclination of the majority of farmers is to use incomplete manures, like bonedust, meatworks manure, &c.

In the choice of suitable fertilisers the farmer must bear in mind the fundamental principle of **soil fertility,** that it is not the large or abundant amount of any particular constituent in the soil which regulates the crop, but that the crop depends more entirely on the **minimum available amount** of any essential plant-food, everything else being favourable. It is not only necessary that all plant-foods are present, but they must be found in certain proportions to give **optimum results** with crops, and if one single constituent is absent, or present in too small a quantity, or in unavailable form, the crop must suffer. The excess of any constituent again may give bad results, and even lead to complete sterility of the soil, but as a rule such excesses are found but rarely, and are rarely to be feared.

In the majority of cases a **soil analysis** will be of value to ascertain the manurial requirement, but we have cases on record where analysis failed to give explanation of the failure of the crop. There are numerous factors, besides the nutrient chemical constituents, which influence the fertility of a soil, like its physical condition, on which chiefly the access of air and moisture depends, its bacterial flora and others.

It is easily understood that fertilisers alone will not ensure success unless other conditions are also favourable, and therefore thorough cultivation must go hand in hand with the application of manures.

There can be but little doubt that **moisture** is one of the most important factors on which the growth of crops depends, and the conser-

vation of moisture in the soil is largely in the hands of the farmer. **Cultivation** again has frequently to be modified according to seasons, and only that farmer will succeed who keeps careful note of observations made during his farming experiences and applying the conclusions drawn from such observations to the future treatment of his land.

With regard to the **kind of manure** to be applied for various crops, the pamphlet "Complete Fertilisers for Farm and Orchard," which is obtainable from the Department of Agriculture and Stock, gives full information with regard to kind and quantity to be applied to crops grown on soil of average fertility. It is quite possible and probable that a modification of the amounts may give better results, and it is quite within the means of any farmer to make a few **simple experiments** to ascertain the most profitable mixture for his soil.

One of the causes of failure in the use of artificial fertilisers is often the **want of lime** in soils, and there again simple experiments will be of much greater value than any amount of theoretical advice.

The experiments themselves can be carried on on a very small scale, taking a row or even only a few plants for each experiment. **Simple manures** of constant composition, like sulphate of ammonia, dried blood, nitrate of lime, may be used as the source for nitrogen; sulphate of potash to supply potash, and superphosphate, or Thomas phosphate to supply phosphoric acid.

By making **plots,** which receive no manure or only **incomplete manures**, the requirements of the crop for anyone of the essential plant-foods will become apparent. Again, one plot which receives a **complete fertiliser** should be treated with lime in addition to ascertain if lime is required or not.

Lime is one of the other most important factors in soil fertility, and many of our coastal soils are rather deficient in lime, as unfortunately lime is one of the constituents most readily leached out by rain. I cannot refrain from quoting from an address given by Mr. A. D. Hall, the late director of the celebrated Rothhamsted Experiment Station, as president of the agricultural section of the British Association for the Advancement of Science, at a meeting in Adelaide:—

"Of all the soil factors making for fertility, I should put lime the first; upon its presence depend both the processes which produce available plant-food in quantities adequate for crop production at a high level, and those which naturally regenerate and maintain the resources of the soil; it is, moreover, the factor which is most easily under the control of the agriculturist."

The following **series of experiments** would have to be carried out:—

1. No manure.
2. Potash and phosphoric acid (incomplete without nitrogen).
3. Potash and nitrogen (incomplete without phosphoric acid).
4. Phosphoric acid and nitrogen (incomplete without potash).
5. Potash, nitrogen, and phosphoric acid (complete manure).
6. Potash, nitrogen, and phosphoric acid and lime.

Now, comparing the results of the returns from the six plots, the following observations could be made:—

If results from 2, 3, and 4 are equally poor, but 5 gives good results, and 6 even better returns, the soil is deficient in all plant-foods. Should 6 give but a slight increase over 5 no liming would appear necessary. Should 2 give a very poor yield, whereas 3 and 4 give fair returns, particular want of nitrogen would be indicated. Again, should 2 and 3 give poor results, but a fair return from 4, the soil requires chiefly phosphoric acid and nitrogen, but contains a sufficient amount of potash, and in fairly available form.

As soon as such experiments have been repeated during a few seasons and with various crops, the particular **requirements of the soil** would be known once for all, and the experiments could be continued to ascertain **other forms** of **artificial fertilisers** to replace those originally used. It may be found that, for instance, nitrate of lime would give better results than dried blood or sulphate of ammonia. On red volcanic soils it is very probable that Thomas phosphate would do better than superphosphate, because the water soluble from of phosphoric acid contained in the latter is rapidly changed into practically insoluble form, whereas the phosphoric acid in Thomas phosphate remains unaltered in a form readily soluble in dilute acid solutions (citrate soluble phosphoric acid).

When making such manuring experiments the farmer is advised to make his own mixtures, and in the choice of fertilisers the following points have to be born in mind:—

Nitrogenous Manures.—The plants utilise nitrogen most readily in form of nitrates, and for this reason nitrate of lime (13 per cent. of nitrogen) and nitrate of soda (15 per cent. of nitrate) are quick acting manures, and therefore often used as top dressing. The nitrogen in the form of ammonia salts, ammonium sulphate (with 20 per cent. nitrogen) is charged in the ground first into nitrates before it becomes available. The nitrogen in dried blood (9 to 12 per cent. nitrogen) and in nitrolim or cyanamide (18 per cent. nitrogen) has also to undergo various changes before being available to plant life.

Phosphatic manures are divided into three classes, with regard to the solubility of the phosphoric acid they contain:—

1st. Readily soluble or water soluble form in superphosphate (containing 16 to 18 per cent. phosphoric acid).

2nd. Fairly soluble or citrate soluble form in Thomas phosphate or basic slag (from 17 to 18 per cent. phosphoric acid).

3rd. Insoluble form in bonemeal (with 18 to 22 per cent. phosphoric acid), rock phosphates, &c.

Bonemeal has to be applied in finely crushed form to be of value, and its success is often due to the small amount of nitrogen it contains, but the phosphoric acid in it is extremely slowly available and may remain in the ground for years.

Potash is nearly always supplied in form of sulphate of potash (50 to 52 per cent. potash), and the use of muriate of potash (58 per cent. potash) and kainit (12 per cent. of potash) is as a rule not advisable.

Experiments with **soil treatment** under different methods of cultivation must not be neglected, and particularly the value of mulching the ground with green crops, or even bush hay and weeds, should be ascertained. The increase of **humus** in the soil must be encouraged, and for this purpose **green crops** should be more generally utilised; in many cases it would pay to manure such green crops and even weeds for this purpose.

MARKET GARDENING.

TRANSPLANTING VEGETABLE SEEDLINGS.

For transplanting, the ground should be prepared, more especially for delicate plants, in precisely the same way as for seed-sowing. The finer the surface soil is, the more easily will the young tender rootlets be able to force their way down in search of food and sustenance; and as a consequence, leaf growth will necessarily follow.

If the soil is hard and lumpy, the attempt of the rootlets to strike into it becomes to some extent useless, and it naturally follows that the top growth also becomes retarded, and it will only be by good luck if the plants come to anything. When taking the plants from the seed-bed, be careful not to break the roots too much, and endeavour to lift them with a little of the soil adhering. Never pull young plants up, but lift them carefully. It is a good plan to give the bed a thorough soaking with water some time before beginning to lift the plants.

Always, if possible, choose a dull or showery day for transplanting, but, should the weather be warm and dry, do the work in the afternoon, and water well after planting; and if suitable material is procurable, mulch the ground for a few inches round each plant. Set the plants a little deeper in the ground than they were in the bed, and firm the soil well around the roots without bruising the necks of the plants.

Take care always to make the hole for planting just deep enough, so that the plant will not hang in it, and give the plants plenty of room to grow, by setting them a little wider in the rows than the size of the plants when fully grown.

For example, if a cabbage will cover 2½ ft. on the outside leaves, set the young plants of that variety out 3 ft. apart each way.

Should the weather be dry for some time after planting, it will be necessary to water the young plants several times a week until they become established; the watering being done either early in the morning or late in the afternoon.

A great deal of watering and hoeing will, however, be saved if *mulch* is used. The importance of mulching cannot be over-

estimated. Almost anything will do—stable manure, grass, or litter of any kind, provided it can be easily and conveniently placed around the plants. Mulching prevents the ground from baking after watering, and so saves hoeing; and it also helps to arrest evaporation, thus saving watering; and also it tends to keep the temperature of the surface soil equable, and so tends to promote healthy and vigorous root-action. I confidently recommend mulching for any kind of vegetable crops which require transplanting, and am sure that the grower who tries it once will never give it up again so long as he aims to get the best possible results from his work with as little labour as possible.

BEANS.

There is a considerable variety of beans for gardening purposes. These comprise French or kidney beans, including the stringless Butter Beans, Canadian Wonder, Pole Beans, Scarlet Runners, Broad Beans, and Lima Beans. All these are annuals except Lima beans, which are perennials in districts where there is no severe winter cold. French beans may be grown all the year round in many parts of Queensland, but where frosts prevail the season may be reckoned from the middle or end of August until April or May. During these months, successive sowings may be made at intervals of two or three weeks when the ground is not too dry. Any good garden soil with grow French beans, but the best crops are obtained from good loams or alluvial soils. The drills should be a few inches deep, varying from 2 to 4 in., according to the weather and the state of the soil. Make the rows 3 ft. apart, and put the seed at least 6 in. apart in the rows.

Should the soil be very dry, water it well before sowing. The beans should be gathered as they become fit—that is, while young and tender; and unless it is desired to save some for seed they should not be allowed to ripen, as thereby the bearing powers of the plants will be considerably lessened.

Pole or runner beans are summer plants, and may be sown from September to February or March. The rows for these should be 4 or 5 ft. apart, and, before planting, poles about 6 ft. long should be set up along the rows at a distance of 3 or 4 ft. apart. Around each pole plant 6 or 8 seeds, 2 in. deep, and when they come up thin them out, leaving four of the strongest plants to each pole. It may sometimes become necessary to tie the young tendrils to the poles at first, but as soon as they begin to run they will twine around the sticks naturally without any artificial help. Broad beans do not succeed well in the hot weather, their season being from March to September. Sow in drills 3 or 4 ft. apart, 3 in. or so deep, and the beans about 9 in. apart in the rows. When the plants come into flower, their tops should be pinched off in order to check the upward growth and cause the beans to set. If this pinching is neglected, in all probability the plants will continue to grow, most of

the flowers will drop off, and there will be little or no crop. The beans should be gathered as they become fit whether they are wanted or not, so as to prolong the bearing season as much as possible.

Lima beans are a good crop to grow in the summer months, as they will stand any amount of heat and dry weather, and continue in bearing for a very long time. The dwarf or bush limas are perhaps the best to grow, as they require no poles, and consequently give less trouble. Lima beans may be planted in August or September, and again in November, and will continue to grow and bear until cut down by the frosts of winter. Dwarf limas may be planted in drills 3 ft. apart, and the seeds 18 in. apart in the rows or in hills of four or five seeds 3 ft. apart each way. The seeds should not be planted more than 2 in. deep, and should be placed in the ground edgeways, with the eyes down.

The pole limas require the same treatment precisely as other pole beans. French beans and most of the pole beans are *pod* beans, of which the edible part is the young and tender seed pod. Broad and lima beans, on the other hand, are *shell* beans, the part used for food being the bean itself and not the pod.

All of these, except the lima, must be used when young and tender. The lima bean may be used green (the bean itself, not the pod) or allowed to ripen, and stored for winter use. They will keep for a long time, and only require soaking in water before cooking to render them soft and palatable. They are the most delicious of the pod beans. Lima beans should be more extensively cultivated than they are, because they will succeed in dry seasons when other beans fail, and continue to bear right through the summer.

The varieties of French beans, including butter beans, are very numerous, and each grower must choose what best suits his requirements.

Of the limas, the largest and most delicately flavoured are Burpee's bush lima.

A good manure for beans is a light dressing of farmyard manure, 4 to 6 cwt. of superphosphate, and 1 cwt. of sulphate of potash (or 4 cwt. of kainit) per acre. The use of 2 cwt. of nitrate of soda per acre gives a very substantial increase of crop. An acre so treated has given an increase of nearly 50 per cent. Where 3¼ tons of French beans were obtained from an acre on which no nitrate of soda was used, 4½ tons were gathered on the same area as the result of its use.

Of late years much loss has been sustained by French bean growers owing to the destruction caused by the Bean Fly. On this subject, Mr. E. Jarvis, Assistant Government Entomologist, says:—

"Attemps to cultivate French beans in Southern Queensland are apt to prove more or less unsuccessful, and in some districts it is almost impossible to grow this vegetable during the summer months. A crop may look promising at the start, but before long the young plants may

show unmistakable signs of arrested growth, and become wilted and sickly looking, droop gradually, and at last topple over one after another in a most disheartening fashion.

"In the absence of any decided external evidence of injury, the grower is naturally somewhat at a loss to account for the cause of such failure, and is usually too disgusted to closely investigate the matter. In such cases, however, neglect is never advisable; and specimens of the affected plants, with particulars as to time of sowing and first notice of attack, &c., should be sent without delay to the Under Secretary of the Agricultural Department.

"The above symptoms are not due to climatic changes, or to the presence of fungi, but to the ravages of a small fly, the grubs of which tunnel in the stems and can easily be found if the skin of a badly-attacked bean-stalk be carefully peeled in places with a sharp pocket knife. Such treatment will disclose a number of tiny pale-yellow maggots, about one-eighth of an inch long, lying close to the surface; and careful scrutiny will reveal the presence of still smaller, reddish, seed-like bodies, immediately under the dried skin, which are the pupæ from which these destructive insects will ultimately issue."

The remedies he suggests are:—

1. Grow a small catch-crop of Canadian Wonder beans very early in the season to meet the first brood of flies, and when these plants are found, upon examination, to be harbouring good-sized grubs, pull them up and burn them without delay.

2. Root up and burn all old bean plants immediately they have ceased to become profitable.

This and the preceding method of control are of the greatest importance, and will well repay growers for any trouble or loss of time incurred.

3. Protect the stems by hilling them up with soil until covered. (Mr. Froggatt says that Sydney market gardeners adopt this plan, which in good growing weather enables a damaged plant to root afresh above the injured portion.)

4. Mr. Tryon reports that the best results have been derived from growing the beans in a shallow trench and applying to the soil (so as not to touch the plants) whitewash made from acetylene refuse, or lime slaked with water, containing carbolic acid or phenyle. Some benefit, he tells us, has been derived from "turning some of the soil back, and either painting the stalks with simple whitewash, to which a little glue has been added to promote adhesion, or sprinkling lime around them."

On small areas, for example, it might be worth while to try—as an experiment—stretching three or four lengths of coarse packing-twine over a row of dwarf beans close to the upper leaves, having first dipped the string in some attractive sticky solution. A few sticks stuck in the ground at intervals would afford all the support needed, and the device, being simple and inexpensive, would, I think, be worth trying.

Pastoral.

PEAS FOR FATTENING SHEEP.

It has remained for the island State of Tasmania to provide the material that goes to show that this branch of rural operations has something out of the ordinary to recommend its more general adoption. In Tasmania peas yield prolifically, so there is every advantage to be gained by farmers using this fodder. Fat lamb raising is a very profitable branch of farming, especially on small holdings and in country where settlers have great difficulty in getting their produce to market. It is an industry which offers considerable scope for expansion, and farmers might do well to test pea-feeding to lambs and sheep. Trials conducted on the north-west coast of Tasmania show that when peas become low in price it pays better to harvest them by means of the stock than to thrash them. With the labour troubles that are now besieging the farming industry this policy of having the produce "Walk off the farm" is one that merits serious consideration. The experiments referred to were conducted by Mr. W. Henry, at Gunn's Plains. He had a fairly large area sown to peas, and as the market promised nothing better than 3s. 6d. per bushel for machine-thrashed delivered at the nearest port, he was induced to experiment on a paddock of 11 acres to ascertain whether it would not be more profitable to feed off with lambs than to harvest them in the usual way. It was estimated that the crop (a light one for the district) would yield 30 bushels to the acre if harvested in the usual manner, under modern methods, and machine-thrashed. The cost of carrying out these operations in a favourable year, including bags and carting, would run into fully £2 10s. per acre. This is necessarily in this instance merely an estimate, but the figures can be readily checked by experienced, practical men, and will be found substantially correct. Thus the net return per acre would be £2 15s., made up as follows:—

	£	s.	d.
30 bushels machine-thrashed blue peas, at 3s. 6d. ..	5	5	0
Less cost of marketing	2	10	0
	£2	15	0

or a net return from the 11 acres of £30 5s.

The paddock was divided by netting into two lots, and 254 shorn lambs, consisting of about 25 per cent. fats and the balance forward and medium stores, valued for this particular purpose at 13s. per head, were placed on one lot at the end of January. When it was eaten out the whole area was thrown open, the peas, of course, being ripe. With the exception of about ten days, when they were taken off to clear up some pea stubble, the lambs had nothing but what these 11 acres supplied till 30th

March, when they were taken off and sold on 2nd April. The result was as follows:—

	£	s.	d.
Net return of 253 lambs (one dead)	208	18	5
Value of lambs when placed on peas, *i.e.*, 254, at 13s.	165	2	0
Net profit	£43	16	5

This shows a profit in favour of the sheep of £13 1s. 5d., or £1 4s. 8d. per acre, independent of any consideration for the undoubted enrichment of the land which might fairly be credited to the sheep or allowed as a set-off for the benefit the lambs derived from the pea stubble during the ten days referred to. It was found that the sheep cleaned up every pea not trampled into the ground. The only possible risk to be run, in Mr. Henry's opinion, is the chance of a wet season, when there might be some waste owing to the peas shooting—a matter that would cut both ways, as the peas, if harvested, would cost so much more in a wet season. He is quite satisfied that with peas at anything under 4s. 6d. per bushel, it is more profitable to feed off with lambs.—"Pastoral Review."

CATTLE IN AUSTRALIA.

In reply to a correspondent, "Town and Country" (Sydney) says:—"In all of the States of the Commonwealth cattle-raising is carried out on a more or less extensive scale, the main object in certain districts being the production of stock suitable for slaughtering purposes, and in others the raising of profitable dairy herds. The great impetus which the development of the export trade in Australian butter gave to the dairying industry in the Commonwealth led to a considerable increase in the numbers and quality of the dairy herds of the States of Victoria, New South Wales, and Southern Queensland in particular, the sub-tropical portion of Australia being apparently the best adapted to this industry. On the other hand, by far the finest specimens of beef-producing cattle are those raised in the tropical districts of the Commonwealth—*i.e.*, in the northern part of Queensland, in the Northern Territory, and in the Kimberley districts in the north of West Australia. Until 1880 New South Wales occupied the leading position in the Commonwealth group as a cattle-raising State, but in that year Queensland forged ahead, and obtained a lead which it has since maintained. The extent of this lead has, however, varied considerably, owing principally to the effects produced by the tick-fever and droughts, from both of which causes the Queensland herds suffered more severely than those of the other States. In fact, during the period from 1894, the number of cattle in Queensland attained the maximum of rather more than 7,000,000 to 1903, when the number recorded was less than 2,500,000, an uninterrupted decline was experienced. During the nine years, ended 1912, however, a rapid improvement took place, and the total reached on 31st December, 1912, more than 5,200,000."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF AUGUST, 1914

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Nellie II. ...	Shorthorn... ...	20 July, 1914	911	3·8	40·54	
Auntie ...	Ayrshire	26 June ,,	851	3·7	36·88	
Lark ...	,, ...	27 July ,,	777	4·0	36·40	
Bee	Jersey	3 July ,,	682	4·5	36·14	
Lady Margaret	Ayrshire	19 June ,,	825	3·6	34·77	
Miss Edition	Jersey	10 July ,,	625	5·5	34·62	
Bluebelle ...	,, ...	27 May ,,	666	4·4	34·49	
Burton's Lady	Shorthorn... ...	23 July ,,	795	3·6	33·47	
Sweet Meadows	Jersey	28 July ,,	573	4·8	32·42	
Countess of Brunswick	Shorthorn... ...	26 July ,,	793	3·4	31·53	
Davidina ...	Ayrshire	17 July ,,	699	3·6	29·46	
Miss Bell ...	Jersey	25 Sept., 1913	424	5·4	27·04	
Lady Athol	Shorthorn... ...	10 July, 1914	677	3·4	26·89	
Lady May ...	Ayrshire	4 May ,,	587	3·7	25·41	
Lady Melba	Holstein	6 Mar. ,,	583	3·5	23·84	
Cocoatina ...	Jersey	20 April ,,	383	5·2	23·51	
Nina ...	Shorthorn... ..	5 April ,,	542	3·6	22·81	
Miss Melba	Holstein	10 July ,,	459	4·2	22·20	

PIG-RAISING IN AUSTRALIA.

The following addresses were recently delivered by Mr. P. H. Suter, Dairy Expert, of South Australia:—

The serious attention given to pig-raising in older countries had not been accorded this branch of industry in Australia, he said. Here there was no animal contributing so much directly to our food supply, nor was there any so badly housed. Indeed, in many places the pig had been looked upon as a scavenger, and only too often treated as the housewife's best sink. We had in this State some excellent animals, the fruits of money spent by breeders, who imported pigs at considerable cost; but there was room for improvement generally, not alone in the type of pig, but in the general management thereof, particularly in housing and feeding. To many, he said, a pig was just a pig, although it cost no more to keep a good one than a bad one. The remarkable fact about improved pigs was the readiness with which they fattened, and the shorter time they took to reach that stage demanded by the butcher. An illustration was given to show the difference in profits that might be

expected from a good sow mated with a well-bred boar and a bad sow mated with an ill-favoured boar, assuming that each produced two litters in one year, thus—A good sow produced 20 bacon pigs, valued at £3 10s. per head, or £70; and feeding expenses, including £5 for keep of sow and £35 for the feeding of progeny, left a profit of £30. The inferior sow produced 12 young pigs, worth £3 7s. 6d. per head, or £40 10s.; and with £5 for maintenance of the dam and £21 for the feeding of the young ones the net profit was £14 10s.

The instability of market was frequently blamed for the erratic interest taken in the subject. This might result from over-production, but more often was due in this State to the fact that heavy supplies were obtainable in the Eastern States. It was also quite possible that prices obtainable were not so profitable when the price of foods, such as barley, peas, &c., were at high levels, or that pigs were marketed when either too light or too old and weighty for trade requirements.

The industry would continue to have its ups and downs just so long as we had no outside market. The only way to secure a sure and permanent market for pigs was through the systematic development of a few bacon and ham factories, not in the city, but in suitable country districts, where conditions were favourable for economical and proper feeding. Manufacturers could then guarantee uniformity of supplies, qualities, and flavour. This could be arranged when low values were likely. It had been done in America, and there was no reason why the example could not be followed here. A few years previously the Advisory Board of Agriculture expressed the opinion that action was desirable, and, when asked for a report, the manager of the Produce Export Department said, and rightly so at that time, that it was practically impossible to secure a supply of pigs suitable for the export trade. Inquiries were made for 100 suitable pigs likely to create a favourable impression in London, but they could not be obtained. Spasmodic trial shipments were subsequently made with varying results, and in one case, after all expenses were paid, the returns were just equal to those ruling locally; but at that time bacon and pork were at low values in London. Only recently the Yahl Factory (Mount Gambier) had sent to the London Dairy and Bacon Show a few sides of bacon that had to compete with the best English products, and, whilst not successful in gaining prizes, it was creditable to find that they beat the New South Wales exhibit by five points. Yet when sold the price netted was approximately 6d. per lb., which was not nearly equal to present local values. Australian bacon suffered by contrast with the English on account of not being specially dressed to English custom, and the flavour did not compare with the English specially fed hogs. England's bill for imported pig products during the past year was approximately £25,000,000 to £26,000,000, and with American consumption overtaking supplies there was a brighter outlook for Australia. Yet the number of pigs had not shown any appreciable increase for 14 years. In South Australia alone 14,000 fewer pigs passed through the Adelaide market in 1913 than was the case in 1912. Present values warranted the feeding of pigs at high pressure, especially now farmers were experiencing difficulty in obtaining remunerative

values for produce such as barley, oats, potatoes, &c. The reverse practice should obtain when foodstuffs were at higher values, and pigs were cheap. Then it was justifiable to treat the pig as the consumer of coarse farm produce, steadily growing into a good frame as a store, to be subsequently fattened up upon concentrated foods.

FEEDING YOUNG PIGS.

Successful feeding of pigs provided one of the most difficult tasks of the farmer. If he pulled the litter through the first 24 hours after birth, he had gone a long way towards successful rearing. Half of the losses among young pigs occurred soon after birth, for many were laid upon unless vigilance was exercised. A lot depended on the health of the sow prior to farrowing. Sows should not be too fat, but should not be allowed to get too low in condition, or they would not provide sufficient milk for their young, nor would the young be so vigorous. Consequently growth would be checked at a period when the piglets should acquire a habit of rapid growth. The sow should come in two weeks before farrowing. A good practice was to give her half a pint of castor oil in the food within a couple of days before farrowing. For a week before it was recommended giving her two bran mashes and a couple of handfuls of bran in the food daily. Prior to this she should have been in a small grass, lucerne, or clover paddock, where she could have sufficient exercise to keep her in good health.

These simple precautions often obviated a vast amount of trouble, and reduced loss by assisting the sow to more readily deliver her young in a much better condition. Often when a sow experienced trouble one or two suckers were born much earlier than the remainder, and in the cold weather these contracted a chill and died, or the sow, being restless, rolled upon them. Further, a sow judiciously fed before farrowing had not the same inclination to devour her young. This habit was due to a depraved appetite. After farrowing was completed, the sow should be moderately fed during the first four days, especially if her udder were well flushed with milk, as the young ones might not take it away fast enough. As a rule she should be given a nice warm feed of milk and bran with a little pollard, but no grain, because it might cause constipation and affect her milk, and consequently the young. At all times a supply of charcoal with, say, a mixture of 25 lb. of lime and 1 lb. of salt, or ½ lb. of saltpetre, should be placed where sows could readily get it in their sties. The sties should admit sunlight, possess good drainage, be free from draughts, and have well-laid floors. If possible a small railing should be placed around the three sides—say 5 in. or 6 in. high, and 8 in. from the walls. The young pigs could then get away safely from their mother when she laid down. The bedding or straw for farrowing sows should not be long, for invariably it was the cause of a death or two among the young suckers, owing to the ease with which they become embedded and consequently laid upon.

Wheaten straw was the best to use for bedding. The little pigs until about three weeks old did little else but sleep and drink. They should not be allowed to roam at large with the mother. When it was noticed

that they had a disposition to do so, it was time to give them a little drink on their own, for much depended upon getting them to learn to drink early. Milk which had had the chill taken off should be supplied in a shallow, clean tin trough, where the sow could not gain access to it. Care should be exercised to see that the suckers did not gorge themselves, or bowel trouble would occur.

If anything were mixed with the milk—say at four weeks—a little barley-meal, but not bran, was recommended. As they grew the pigs might have a little scalded pollard added. This prepared them for the critical period of weaning, which should take place at about eight weeks old. Young pigs rarely went wrong, and, if they did, it was generally due to ill-judged feeding just before or after weaning. All male pigs should be emasculated at about three or four weeks old. If castrated, say, at six weeks to two months, they invariably possessed a much thicker rind when made into bacon. With liberal feeding in the form of milk or whey with pollard, soaked, crushed barley, wheat, and green feed, the young pigs should have made good growth at eight weeks old, and were then well able to look after themselves. Should they scour at any time when sucking the sow, the food of the latter should be changed. When weaned, they should be fed at frequent intervals to minimise the loss of their mother's milk as much as possible.

FEEDING.

"The opportunity to make money out of pigs is," he continued, "to a large extent governed by methods of feeding—the general aim should be to supply at the least cost a ration producing the highest quality of pork or bacon. In years gone by the main object was to produce a pig of extra heavy weight, but what is now required is a younger and lighter pig for Australian use—for pork, say, 80 lb. to 90 lb.; and bacon 120 lb. dressed weight. The English market demands heavier pigs, say, from 160 lb. to 180 lb. The pig killing 120 lb. weight for bacon is the most economically fed. A young pig, if properly fed, will produce 1 lb. of green pork out of 4 lb. of food equal in food value to pollard, whilst a fully-matured pig may take from 6 lb. to 8 lb. to make the same gain of 1 lb. in weight. Taking pollard at 1s. per bushel, or 0·6d. per lb., when fed to a young pig the pork will cost less than 2½d. per lb., whereas the cost of adding weight to a pollard-fed mature pig is over 3½d. each lb.

"Pigs may fairly be said to be the most economical meat producers of all farm stock, judged by the quantity of meat for the food consumed. The average weight of a sucker when born is 2½ lb., and from reliable records we find that under proper management they will make an increase in weight during the first week of almost 2 lb., equal to an increase of, say, 76 per cent. The percentage gain in weight for food consumed becomes less every week, until in the sixteenth or seventeenth week the increase is not more than 6 per cent. There is a difference of opinion in the mind of feeders whether it is better to cook grain or simply to soak it. Soaking has proved to be the preferable method, being cheaper and handier. Exhaustive experiments have proved that on an average 505 lb. of cooked grain will produce 100 lb. of pork, whereas 476 lb. soaked

will give the same results. Another point of interest was proved—viz., that by feeding mixed grains a saving of at least 15 per cent. in the amount required to produce 1 lb. of pork was effected.

"The maintenance requirements of a pig have been set down at 2 lb. of food possessing the equivalent food value of 2 lb. pollard for every 100 lb. live weight, and it is only when they receive food in excess of this amount that they make increased weight and lay on flesh. Providing they are properly fed, then the more they can be encouraged to consume in 24 hours the quicker will they be fit for market. The feeder should never allow any excess over requirements to be left in the trough, feeding only just what they will clean up. It is not advisable when feeding to give it in too sloppy a condition, but more of the consistency of porridge—say, 3 of milk, whey, or water to 1 of solids—pollard, barley, wheat, &c. A plentiful supply of good water should at all times be available for the pigs. When young growing pigs are out running on pastures, do not cut off their supply of milk and grain, but give a little always, and finish them off in the sty with grain. If during the period between the sixth to the twelfth week of the life of the pig it is injudiciously fed and stunted, it will become a poor doer, and, no matter what subsequent treatment it may receive, will not be so profitable.

"Solid foodstuffs recommended are:—Peas, beans, barley, oats, bran, pollard, rye, wheat; greenstuffs include lucerne, clover, peas, barley; roots comprise potatoes, mangels, swedes, artichokes, &c.; and liquids, skim milk, water, and whey. Peas provide a large percentage of protein or nitrogenous matter, and are consequently good for young growing pigs and the production of lean bacon. If fed whole, they are very palatable, but prove too wasteful, a large percentage passing through the system undigested. When crushed, they are better. Pea-meal, whilst a valuable food, must not be fed alone. It is difficult to digest, and is likely to sicken pigs. A good plan is to add a little ground oats with the peas. Beans, where they can be grown successfully, prove excellent food. They are rich in protein, and are thus valuable for enriching the ration. However, if fed in any considerable quantity, they will result in producing what is known as a soft bacon; so for best results it is advisable to feed them with other grain.

"Barley may with truth be described as the best of all grains for pigs, especially for the production of good bacon. This applies both for quantity and quality. Barley should always be crushed and soaked, and for young pigs should be mixed with pollard. Damaged wheat is also a valuable food for the production of good bacon, and gives better results when converted into pork than when sold as grain. It takes on an average 5 lb. of wheat to produce 1 lb. of pork. Split or damaged wheat can at most times be turned over to a greater profit in this way. Rye has a lower feeding value than either wheat or barley. It will, however, produce an equal increase in weight of the pig, but the quality of the flesh is inferior, and therefore it is advisable to mix it with other grain. Where oats are largely used, the husks should be removed by soaking in water. They are excellent food for feeding grown pigs, making good meat, but they have a slight disadvantage, being of rather too fibrous a

nature for young pigs. A little crushed oats are best mixed with other foods. The famous York hams are supposed to owe much of their excellent flavour to the fact that the pigs are very largely fed upon oatmeal.

MILL AND DAIRY BY-PRODUCTS.

"Pollard has at all times proved an excellent food when fed to pigs of all ages and for all purposes; but, having the reputation of producing pork of rather a soft nature, for this reason it may be better fed with a little barley or damaged wheat. Pollard when fed with milk gives very satisfactory all-round results. Bran, although rich in protein content, must not be accepted as a pig fattener. It is an excellent milk producer, and for this reason is valuable food for a sow just before or after farrowing. It also has the effect of keeping the bowels in good order. Because of the high food value of separator milk, dairying and pig-raising must go hand in hand for best returns. By no means can pigs be so profitably turned into good baconers as where a liberal supply of skim milk is available. To obtain fullest value, it must be fed in conjunction with any of the grains grown upon the farm. Whilst of considerable value as a food, whey is not equal to skim milk or butter-milk, especially when fed to younger pigs. Again, it will not produce as good a quality of bacon unless it has other foods rich in protein content added to it. The bulk of this valuable food constituent is taken from the whole milk to form cheese. The feeding value of whey is really only half that of separator milk. In Denmark the results obtained from most exhaustive experiments proved that for feeding purposes 6 lb. of skim milk were equal to 12 lb. of whey or 1 lb. of crushed barley. When feeding whey it is advisable to use, say, 3 lb. to 4 lb. with 1 lb. of crushed barley-meal or pollard. Pure butter-milk to which no water has been added is of equal food value to skim milk. Farmers must not forget that this when obtained at factories almost always has a large quantity of water, possibly 30 per cent. to 50 per cent., added to it. Many instances could be given of considerable loss being occasioned where pigs were fed on watered butter-milk alone—a form of starvation—there being insufficient nutriment or solids present to satisfy the ordinary maintenance of body demands. Butter-milk, as taken from the factories, when fed with grain or pollard, &c., to make up for any deficiency in nutriment, will give good results.

GAIN IN LIVE WEIGHTS.

"Taking it that the young pig when ready to wean weighs 26 lb. to 32 lb. live weight, at 10 weeks he should weigh 40 lb., and at 6 to 7 months he should turn the scale at 150 lb. to 180 lb. live weight. The following will produce 1 lb. extra of flesh, viz.:—4½ lb. of soaked barley, or, preferably, 3·64 lb. of soaked barley with 5 lb. of separated milk, putting on the extra weight from 40 lb. to 180 lb. at the following cost, milk being free: Ten and a-half bushels of barley at 2s., £1 1s. Seventy gallons of separated milk would also be required. Assuming the young pigs cost the breeder at 10 weeks 19s., the total cost till ready for the knife would be £2. At present values the pig weighing 160 lb. live weight would realise £3 10s., leaving a profit of 30s. per pig. This gives a return

of 4s. per bushel for barley and 9s. for any little labour connected with the feeding and skim milk. The mating of very young sows with the boar at 6 to 7 months is not always advisable. A difference of opinion exists whether to mate at 6, 10, or 15 months; but generally the 10 months is accepted as the better age. The young sow may be very restless or excited when farrowing owing to inexperience, and at times a shortness of milk supply will result. In this case remove the young, and when the sow finishes farrowing quietly place one or two little ones to her teats; she will then generally respond and let down her milk, when all suckers may be put with her. Young and very aged sows should be fed three times daily when suckling a good litter, the food being of soft character, warm, and easily digested.

RETURN FOR VARIOUS RATIONS.

"Pigs of from 60 lb. to 100 lb. live weight consume on an average 3·35 lb. of foods, say, pollard, per day; and when at 100 lb. to 150 lb. of live weight, 4¾ lb. If pure butter-milk only is fed, the pig would require to consume 6 gallons to obtain sufficient nutriment, whilst 9 gallons of ordinary diluted butter-milk would be necessary if used as a substitute. Potatoes offer many advantages to pigkeepers when the price is low, like barley and oats; so that nothing better can be done than to feed them. They require to be fed in conjunction with grain, more specially with milk or whey. The best results are obtained by feeding 4 lb. of soaked grain, 4 lb. of skimmed milk, and 3 lb. of potatoes. In food value 4 lb. of potatoes are equivalent to 1 lb. of barley or wheat as a food. Potatoes, although good when fed raw, are improved very much by pulping and cooking. They should always be cooked, and the water from the potatoes should not be used, as the tannin contained in it will coat the stomach, and prevent a free and natural secretion of the digestive fluids. When fed to young pigs, the following rations will be required:—No. 1—Cooked potatoes, 3 lb.; skimmed milk, 10 lb.; or No. 2—Cooked potatoes, 4 lb.; butter-milk, 6 lb.; barley, 1 lb. Sugar beets are preferred by pigs to any other roots. It is not advisable to give them too freely, but they may form a fourth of the ration. Lucerne, tares, and clover are all valuable for grazing, or feeding a little in the sties; but grain must also be given. Molasses is sometimes given to pigs in small quantities, say, 1 lb. per day; its chief value is as an appetiser. Any kind of fruit may be fed, but it must be distinctly understood that grain must also be added. All pigs are the better for a run in a nice, handy, well-grassed paddock of lucerne.

EARLY MATURITY.

"The secret of producing early pork is to give a liberal allowance of green feed. When fattening for bacon, it is advisable to put pigs in the pen at, say, 5 months old. At this age, if judiciously fed, they will develop into nice-conditioned baconers at 6 to 7 months, and weigh from 120 lb. to 130 lb. dressed. Porkers should weigh 70 lb. to 90 lb., and this weight can be produced at 4 or 5 months, according to breed and feeding. Danish breeders mix their grain as follows:—For pigs up to 4 months old: Mixture, 8 parts of wheat, 8 parts of barley, 1 part of oats. For

pigs over 4 months: Mixture, 14 parts barley, 4 parts wheat, 1 part oats. All the food is soaked and crushed, and green food is supplied at midday. For a sow producing two litters (each of eight suckers) a year, a farmer would require to provide the following amount of food to rear them:—Daily rations for sow carrying litter: 7 lb. to 8 lb. of grain, 1½ gallons separated milk, 5 lb. of good green lucerne. It will take approximately 18 bushels to 20 bushels of grain and 75 gallons of skimmed milk to rear each pig, inclusive of feeding to sow; to rear 16, 36 bushels of grain, 1,250 gallons of skimmed milk, and green feed.

"Daily rations for pigs, supplying all that is necessary for body development and fattening, with skimmed milk not charged up in the costs, include:—No. 1: Daily rations from 2 to 3 months old, 6 lb. of skimmed milk, 1½ lb. of pollard, 1 lb. of barley. The month's total food amounts to 45 lb. of pollard, 30 lb. of barley, and 18 gallons of skimmed milk; total cost, 3s. 5d. No. 2: Daily ration from 3 to 5 months old, 2 lb. of wheat, 2 lb. of barley, 6 gallons of skimmed milk. Total requirements for the two months (60 days), 120 lb. wheat at 3s. per bushel, 150 lb. of barley at 1s. 10d., 36 gallons of skimmed milk; total cost, 11s. 6d. From 5 to 6 months old a daily ration is recommended as follows:—3 lb. of skimmed milk, 2 lb. of wheat, 3½ lb. of barley. This would cost for the month—Wheat, 3s.; barley, 3s. 10d.; with total cost for the month's feeding, 6s. 10d. In the final month (sixth to seventh month) peas may be fed with the ration to top off. Where no peas are grown, feed daily 1½ lb. of wheat, 5½ lb. of barley. With wheat costing 2s. 3d. and barley 6s., the total cost for the month would be 8s. 3d. The total cost of food from weaning to marketing condition would be £1 10s., made up as follows:—Barley, 9 bushels at 1s. 10d. on farm, 16s. 6d.; wheat, 3 bushels 45 lb. at 3s. on farm, 11s. 3d.; pollard, 2¼ bushels at 1s. on farm, 2s. 3d. Where potatoes are low in value or unsuitable for market, they may be fed with much success. A good ration for fattening a pig is 1 gallon of skimmed milk or butter-milk, 4 lb. of soaked barley, and 3 lb. of cooked potatoes. A little green lucerne during the summer, or lucerne hay during the winter, is an excellent food in conjunction with the rations mentioned, varying the quantity from 1 lb. to 3 lb. daily, according to age.

STUDY MEAT AND FODDER MARKETS.

"It has been shown that one can raise a properly cared for young pig from 2 months of age until ready for market, when 160 lb. live weight, at a cost of 30s. Such a pig would realise from 75s. to 85s., leaving a substantial profit. To dairymen, who can best raise pigs profitably on account of their having skimmed milk, it requires approximately 80 gallons to feed the sow and raise each young pig. Therefore, 1 sow to every 8 cows kept should be a safe margin, or perhaps it would be better to say 1 cow to every sucker. A sow producing two litters of eight in each litter requires the following food daily, when carrying her litter for, say, eight weeks:—6 lb. to 8 lb. of grain, 1½ gallons of skimmed milk, 5 lb. of greenstuff, lucerne, &c. With foodstuffs at present low values, and pigs realising excellent prices, there are great possibilities in pig-raising,

especially in districts where cows are kept as the main source of income. Such a fine source of revenue should not be neglected. In conclusion, it may be said that a liberal feeder may easily let the profits slip through his fingers by keeping his pigs in dirty, draughty, and cold sties; feeding a badly-bred, non-thrifty, long-legged, and unshapely animal; or by irregularity in feeding and careless marketing. When forwarded to market, the pigs should be well protected from the sun and given, if possible, a good hosing with water; this will add to their comfort, and improve their appearance. They should not be travelled upon a full stomach. This caution is especially applicable in hot weather, as it often means the death of one or more. At present values it would be ridiculous to think of exporting. This can only be entertained when values are at a much lower level. The pig business to-day, and, so far as one can foresee into the future, is a most profitable proposition by reason of easy breeding, cheap feeding, and highly remunerative values obtainable at an early age."—"The Dairyman," Toowoomba.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5·35	5·25	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·24	5·50	4·55	6·9	4·46	6·31
7	5·57	5·36	5·23	5·50	4·54	6·9	4·46	6·32
8	5·56	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·33
10	5·53	5·37	5·19	5·52	4·52	6·11	4·47	6·34
11	5·52	5·38	5·18	5·52	4·52	6·12	4·47	6·35
12	5·51	5·38	5·17	5·53	4·51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·14	4·48	6·37
15	5·48	5·40	5·14	5·54	4·50	6·15	4·48	6·37
16	5·46	5·40	5·13	5·55	4·49	6·16	4·48	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·42	5·11	5·56	4·49	6·18	4·49	6·39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·40
21	5·41	5·42	5·8	5·58	4·47	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6·21	4·51	6·42
23	5·38	5·43	5·6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	6·0	4·47	6·22	4·52	6·43
25	5·36	5·44	5·4	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6·1	4·46	6·24	4·53	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·25	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.			H.	M.	
5 Sept.	○	Full Moon	12	1	a.m.
13 „	☽	Last Quarter	3	48	„
20 „	●	New Moon	7	33	„
26 „	☾	First Quarter	10	3	p.m.
4 Oct.	○	Full Moon	3	59	p.m.
12 „	☽	Last Quarter	7	33	„
19 „	●	New Moon	4	33	„
26 „	☾	First Quarter	8	44	a.m.
3 Nov.	○	Full Moon	9	49	a.m.
11 „	☽	Last Quarter	9	37	„
18 „	●	New Moon	2	2	„
24 „	☾	First Quarter	11	39	p.m.
3 Dec.	○	Full Moon	4	21	a.m.
10 „	☽	Last Quarter	9	32	p.m.
17 „	●	New Moon	12	35	„
24 „	☾	First Quarter	6	25	„

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1914.

Five thousand seven hundred and sixty-six eggs were laid during the month; an average of 144 per pen. The birds are now doing good work, all being now over the moult, with the exception of one of J. M. Manson's, which is in heavy moult. T. Fanning's Black Orpingtons win the monthly prize with 165 eggs. The following are the individual records:—

Competitors.	Breed.	August.	Total.
T. Fanning	White Leghorns	134	610
Kelvin Poultry Farm	Do.	141	583
A. T. Coomber	Do.	143	571
Moritz Bros., S.A.	Do.	152	520
Loloma Poultry Farm, N.S.W.	Do.	154	515
Loloma Poultry Farm, N.S.W.	Rhode Island Reds	152	511
R. Burns	Black Orpingtons (No. 1)	162	492
J. T. Coates	Do.	142	484
Geo. Tomlinson	White Leghorns	159	482
J. P. Wilson	Do.	124	472
Cowan Bros., N.S.W.	Do.	154	466
R. Burns	S. L. Wyandottes	162	462
E. Le Breton	White Leghorns	160	445
R. Jobling, N.S.W.	Do.	140	441
A. F. Camkin, N.S.W.	Do.	145	442
G. E. Austin	Do.	132	440
Mrs. Bieber	Brown Leghorns	142	439
J. Gosley	White Leghorns	135	438
R. Burns	Black Orpingtons (No. 2)	153	438
J. D. Nicholson, N.S.W.	White Leghorns	131	432
A. H. Padman, S.A.	Do.	159	425
E. V. Bennett, S.A.	Do.	151	422
J. Franklin	Do.	155	422
Mrs. Munro	Do.	153	416
J. Manson	Do. (No. 1)	139	414
T. Fanning	Black Orpingtons	165	414
J. T. Coates	White Leghorns	141	411
Marville Poultry Farm, Victoria	Do.	148	407
J. Kilroe	Do. (No. 1)	119	405
Derrylin Poultry Farm	Do.	144	402
F. McCauley	Do.	142	400
J. Kilroe	Do. (No. 2)	134	392
D. Moreton	Do.	140	388
Range Poultry Farm	Do.	148	375
J. Zahl	Do.	140	373
Mrs. Bradburne, N.S.W.	Do.	135	372
J. N. Waugh, N.S.W.	Do.	125	365
C. M. Jones	Do.	144	342
J. M. Manson	Do. (No. 2)	128	318
J. Murchie	Brown Leghorns	139	318
Total		5,766	17,464

THE COMMERCIAL SIDE OF POULTRY KEEPING.

To rear poultry as an adjunct to dairy-farming, pig-breeding, or market gardening is one thing. To rear poultry for profit on a poultry farm is quite another proposition. The Rev. T. W. Sturges, M.A., discussing this matter in his exhaustive work on poultry, says that poultry keeping as a hobby is a delightful occupation, and to the vast multitudes who undertake it for this end is due the fact that it may sometimes be made a commercial success. There is no reason why anyone of average intelligence should not make his poultry repay him for the trouble bestowed. But to make it the sole business of life from which the maintenance of a man and his family may be derived, is quite another matter. To look upon the calling as a sort of oasis in the desert—an Arcadia of life, where fruits grow without the planting or watering—is little short of a delusion. Many have made a shipwreck of their hopes in attempting it; of the many who have tried it none have found it to answer, or, if any have done so, they have kept the fact a profound secret. That the small farmer who keeps twenty or thirty head of poultry has found it reasonably profitable is no answer to the question. The food bill on a farm is small, and the garden and house scraps supply the bulk of it. The case is very different with the poultry farmer pure and simple. His expenses are heavy for feed, housing, transport, &c. There are delusive books—fairy tales which narrate such easy problems as: "If 4 hens cost £1 a year to keep, and lay eggs, which, at 1d. each, bring in £2, or £1 profit, then 400 hens will bring in £100, and 4,000 hens £1,000"; and so on. Other misleading statements are based on a single hen bringing in 30s. a year! Multiply this by 200, and you have £300 a year. All you need for this is a cottage and a couple of acres of land, since every hen will lay in the winter 100 eggs, which sell at 2s. a dozen; and those she lays and hatches in the summer will find a ready sale as day-old chicks at a guinea a dozen, &c., &c. When a new breed shall have been discovered with a clockwork interior which needs only a yearly winding up, and is guaranteed to keep time, then "success will be certain." Meanwhile, we wait!

If these schemes were practical on a colossal scale, millionaires would be as plentiful as blackberries in autumn. Mr. Sturges puts it down as a very good average result that, if a poultry farmer on this system gets 5s. per head, he is doing well. And if he has 400 birds to look after, and has to raise his yearly flock of chickens to replace the old ones, he will be fully occupied. Where one man does this, seventy fail to do so; most who have tried it have to be content with less, and very many have failed to make both ends meet. But, it will be said, "There are poultry farmers who earn a good livelihood." The answer is, "Yes, there are many who do so, but it is not by such methods." These are men who have made a study of the business, and have not taken to it because they have failed at everything else. They have either served an apprenticeship to the business with those who have already been successful, or have served the longer apprenticeship of experience.

The people who make a good livelihood out of poultry farming are not those who keep hens simply to supply the table with fresh eggs and dead poultry, but those who breed purebred poultry of the more popular

breeds and varieties and sell the eggs for hatching purposes, and raise stock and sell them to others for breeding or for exhibition, or exhibit the birds in their own names.

Mr. Sturges divides these roughly into two classes—(1) Those who breed chiefly for exhibition purposes, and by means of advertising and exhibiting their stock, get enhanced prices for them, as well as high prices for the eggs they sell for hatching. (2) Those to whom exhibiting is only a minor part, but who breed high-class stock, and sell a great number of both for breeding and for laying to the very large number of patrons who like to see purebred stock about them. It is entirely due to the fancier that we have breeds and varieties of fowls that will lay from 150 to 180 eggs or more a year. The absolute mongreldom which still prevails on the average farm homesteads, as well as in the cities and suburbs, would have been universal had it not been for the fancier and his carefully selected stock.

As far as eggs for the markets is concerned, there is an unlimited demand all over the State. Grocers and other tradesmen who sell them are always willing to buy and pay fair prices for clean, fresh-laid eggs, prices fluctuating, of course, according to the season of the year.

LEGHORN-ORPINGTON.

"Here is an interesting item about breeding," says an Exchange: "Say you have some Black Orpington hens that turned into lay when they were eight months old. If you put a Leghorn cock with these hens, the crossbred pullets will turn into lay at six months, and they will be shapely birds—a cross between the neat, clean-cut Leghorn and the bulky Orpington. In fact, also, the crossbreeds will all be white with the exception of a few black splashes and spots here and there that will show up on some, but most of them will be all white. The Orpington is practically rubbed out in the combination excepting that most of the crossbred pullets will become broody, same as their mothers, and the eggs will be tinted. They won't be white-shelled like those of the Leghorns, nor a rich brown like those of the Orpingtons.

"Another breeding 'tip': 'Do what you will you can't breed out the rose comb,' says the same writer. 'You may go in for as many crosses or combinations with single breeds as you like, but when the rose comb once gets in, it is there to stay, and it will pop up for all time afterwards. Not every year, may be, but it will show up every now and again, and you will never breed it out. You know the Dorking has five toes? Well, the same remarks apply—once you get the five toes into a strain you will never breed it out.'

"You will Never Breed out the Rose.—That seems to us quite a mild way of putting it. If strong brown egg swamps weak white egg, strong broody swamps non-broody, strong white colour swamps weak black, strong Leghorn type swamps weak Orpington type, strong early laying swamps weak late laying, strong normal toe swamps weak fifth toe, why does not strong rose comb swamp weak single comb? The

answer, of course, is that man protects the weak single by selection. In nature, or in any unselected yard the strong rose would not only keep popping up casually but it would do so continually to the extent of three-quarters of the whole. The facts mentioned are interesting and important in their teaching, so our contemporary must forgive our collaring his text to preach a different sermon on. Those results of crossing are, as we said, interesting. The reason why they occur is, we think, equally so.

"In passing, we would point out the clear distinction between strength and weakness, dominance and non-dominance brought out throughout. There is evidently some underlying reason which is common to all those contrasting characters. What applies to one will probably apply to all. We see evidence of marked dominance in early laying and conversely marked non-dominance in late laying; also what may be called an intermediate state in the case of the strong brown and the weak white which become tinted.

"Never is quite a long while; but when we read that 'do what you will you will never breed out the rose,' our first thought was one of sorrow for the many misguided people who think they can. What sad mistakes you have made! When we remembered the immense amount of evidence and experimental work they had backed their opinion with, we mentally add 'unless you know how' to the heading of this paragraph.

"The Rose and Single Comb is not of itself of any great importance, but its evidence to animal breeders is what the tall and dwarf sweet pea is to plant breeders, one of the chief corner stones of the new gospel. Further, from the poultryman's point of view, if these men are correct in their theory and evidence of comb formation, may they not be correct in their interpretation of some or all the other contrasting characters mentioned. We see great similarity of effect; may we not deduce similarity of cause. If it can be shown that a strong character like rose and a weak character like single can be bred in or out at will, may we not hope that broodiness, shell tint, age of laying and character of laying may, by the same procedure, be likewise bred more in accordance with the breeders' wishes and expectations than is the case at present. That such may be and probably is a fact has, in many cases, been demonstrated beyond question, is our excuse for the above and succeeding paragraphs.

"Let us mate a 'pure' R.C. male with a pure S.C. female, or the reverse, and we get all R.C. chicks. This is a question of fact—of common experience. Why did we get them? Because the R.C. character is stronger than the S.C. character. These chicks are the first generation. At this point it is interesting to ask whether the S.C. character has been wiped out of the constitution of these first generation chicks. It certainly looks like it, for though they may not all be perfect R.C.'s, they will be R.C.'s and none will be S.C.'s. The combs, like the birds themselves, will be crossbreds. The answer to the question we have asked is—No. That is theory. It can be proved by mating any two of these first generation birds together, for they will give you R.C.

and S.C. chicks. It is evident, then, that the S.C. character either skipped a generation, which implies that it came from nothing in these chicks or that the character was hidden—present but not expressed in bodily form. As you cannot create something from nothing the latter must be accepted as the correct explanation. In other words, they will have a character for R.C., which is shown, and a character for S.C., which is not shown.

" The explanation is that the germ cells (gamates or marrying cells) which came from the R.C. parent male had the R.C. character, and the germ cells which came from the S.C. female parent had the S.C. character. In fertilisation, which is the union of whatever characters came from the male with whatever characters came from the female, they met in the eggs which, when hatched, produced these first generation chicks. As we have seen the R.C. character is stronger than the S.C. character, so the former was shown, the latter hidden. That seems simple so far. The R.C. character in each chick is accounted for and the hidden presence of the S.C. in each chick explained. That ends the first generation and we are left with a yard full of R.C.'s.

" The question now comes—Do we want to breed R.C. or S.C. birds? The procedure in either case is the same. All these chicks now grown into adults are exactly the same as to comb, so we take any male or several males and mate them with one or several females. What would happen? As we already know, we should get R.C. and S.C. chicks (second generation) because they (the parents) all have R.C. and S.C. characters in their constitution—that is, they are really crossbred or hybrid for comb formation.

" What happened was this: The male contributed R.C. and S.C. to the marrying cells he formed, not both to each cell but Rose to half and Single to half. The female contributed R.C. and S.C. to the marrying cells she formed on the same terms. When these marrying cells met in fertilisation—that is, in the eggs which produced this second generation —there were four possibilities—

" 1. R.C. from a marrying cell from the male met R.C. from a marrying cell from the female; or,

" 2. R.C. from a marrying cell from the male met S.C. from a marrying cell from the female; or,

" 3. S.C. from a marrying cell from the male met R.C. from a marrying cell from the female; or,

" 4. S.C. from a marrying cell from the male met S.C. from a marrying cell from the female.

" So out of every four eggs we get—

" 1. A chicken which gets R.C. from the union of two marrying cells, both of which carried R.C. but not S.C. It is a ' pure ' R.C., and will, when mated with any other ' pure ' R.C., give ' pure ' R.C. chicks. Why shouldn't it? There is no hidden S.C. in its constitution.

" 2. A chicken which gets R.C. from the union of two marrying cells, one of which carried R.C. and the other S.C., R.C. is stronger than S.C., so it is ' impure ' R.C.—*i.e.*, though R.C. is shown S.C. is present but hidden. Consequently this chick cannot be depended on to throw

either all R.C.'s or all S.C.'s. It will throw both, either with ' pure ' R.C.'s or ' pure ' S.C.'s or with birds of its own constitution.

" 3. A chicken which gets S.C. from the union of two marrying cells, one of which carried S.C. and the other R.C. It is of exactly the same constitution as No. 2 and of the same breeding value.

" 4. A chicken which gets S.C. from the union of two marrying cells, which carried S.C. but not R.C. It is ' pure ' S.C., and will, when mated with any other ' pure ' S.C., give ' pure ' S.C. chicks. Why shouldn't it? There is not a trace of R.C. in its constitution. In this case there is no strong R.C. to hide, mask, or suppress it. All things are possible, but there seems about as much chance of a bird so bred throwing R.C. chicks as there is of the millenium."

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1913 AND 1914, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of Years' Records.	Aug., 1914.	Aug., 1913.		Aug.	No. of Years' Records.	Aug., 1914.	Aug., 1913.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·91	13	1·18	0·03	Mount Larcom ...	...	...	1·3	..
Cairns	1·48	27	4·93	0·18	Nanango	1·55	27	0·18	0·09
Cardwell	1·16	27	1·19	Nil	Rockhampton ...	0·97	27	Nil	Nil
Cooktown	1·28	27	7·22	0·03	Woodford	2·05	27	0·89	Nil
Herberton	0·65	27	1·10	Nil	Yandina	2·18	21	1·73	Nil
Ingham	1·44	22	0·54	0·04					
Innisfail	5·30	27	10·53	0·91					
Mossman	1·58	5	2·36	0·47	*Darling Downs.*				
Townsville	0·40	30	0·03	Nil					
					Dalby	1·26	27	0·39	Nil
					Emu Vale	1·36	17	0·17	Nil
Central Coast.					Jimbour	1·41	24	0·37	Nil
					Miles	1·23	27	Nil	Nil
Ayr	0·40	27	Nil	Nil	Stanthorpe ...	1·72	27	0·31	Nil
Bowen	0·68	27	0·09	Nil	Toowoomba ...	1·89	27	0·44	Nil
Charters Towers ...	0·44	27	Nil	Nil	Warwick	1·59	27	0·15	Nil
Mackay	1·19	27	0·32	Nil					
Proserpine	0·77	11	2·13	Nil					
St. Lawrence ...	1·15	27	0·28	Nil	*Maranoa.*				
					Roma	1·04	25	Nil	Nil
South Coast.									
					State Farms, &c.				
Crohamburst ...	2·37	20	2·07	0·06					
Biggenden	1·27	14	0·44	0·02					
Bundaberg	1·56	27	0·36	0·02	Gatton College ...	1·49	14	0·25	Nil
Brisbane	2·28	63	0.29	0·02	Gindie	1·74	13	Nil	Nil
Childers	1·33	19	0·34	Nil	Kamerunga Nurs'y	1·54	23	3·49	0·27
Esk	1·75	27	0·24	Nil	Kairi	...	...	2·24	0·18
Gayndah	1 22	27	0·16	Nil	Sugar Experiment Station, Mackay	0·84	16	0·21	Nil
Gympie	1·65	27	1·31	0·08					
Glasshouse M'tains	1·72	6	1·13	Nil	Bungeworgorai ...	...	...	Nil	Nil
Kilkivan	1·12	27	Nil	Nil	Warren	...	...	Nil	0·17
Maryborough ...	1·59	27	1·62	Nil	Hermitage ...	1·90	7	Nil	Nil

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

State Farms.

BUNGEWORGORAI.

Report for the month ending 13th September, 1914.

Meteorological.—Dry conditions have prevailed, as during the past seven weeks only 2 points of rain have been recorded. At time of writing there are favourable indications of a break, isolated showers having been noticed falling during the past few days in the surrounding districts. Maximum temperature recorded was 80 degrees; average, 71·5. Minimum temperature, 34 degrees; average, 46·3. Rainfall, 2 points.

Winter Cereals.—Despite the unfavourable but not unseasonable dry spell (August having proved to be the driest month here during the past 30 years), the crops look well, more especially the early ones, which in some instances should be fit to harvest in five or six weeks. As a result of this season's operations, many varieties grown for a number of seasons past in blocks will in future be confined to drills only.

Vineyard.—The advent of the warmer weather has resulted in the earliest of the varieties of vines being at the present time sufficiently advanced to enable disbudding being carried out.

Orchard.—All the citrus fruits are blossoming very freely. Apricots, plums, peaches, &c., are in flower, and a fair crop of fruit should result, given suitable weather conditions.

Summer Crops.—With the exception of a few melons, marrows, &c., no sowings have as yet been made of these. The reason for this is owing to the fact that upon completing sowing of winter cereal crops other work occupied the attention of the teams, thereby preventing early preparation of seed-beds in sufficient time to derive benefit from rains experienced in the latter part of July. All the available suitable land (28 acres) has been worked up, and only awaits sufficient rain to enable it to be brought to the desired condition for sowing.

Grass.—Rhodes grass on the light country still keeps on growing, and, where sheltered, has grown continuously throughout the winter.

Stock.—All the live stock at this institution look well. The horses, which have been working continuously since last February, are in good condition, though a spell would no doubt do them good.

General.—The round timber for the additions to the hayshed and stables has been secured, and the cutting and drawing of the material for a crush and yard are being gone on with. Visitors, as is usual at this period of the year, are becoming more numerous, this being the most suitable period for persons interested in wheat culture to visit this institution.

The manager of the State Farm, Roma, reports as follows for the month of August, 1914:—

Meteorological.—Dry weather has prevailed since forwarding previous report. In the early part of the month frosts were experienced, whilst during the latter portion summer-like weather has prevailed. The maximum temperature recorded was 78 degrees; average, 70·8. Minimum temperature, 32 degrees; average, 40·4. Rainfall, nil.

Crops.—Winter cereals: These, on the whole, look exceptionally well, though traces of rust are to be met with in the most forward crops. Rain, though not urgently necessary, would considerably improve the prospects if experienced within the next fortnight. The early-sown early-maturing varieties, which cover an area of approximately 27 acres, are well out in ear, and have in some instances been so for three weeks.

Summer Crops.—The land is in the course of preparation for these. The area intended for spring sowing awaits rain to put it in the desired condition.

Orchard.—The pruning of the deciduous trees has been accomplished some time. Early varieties of peaches, apricots, &c., are in full bloom.

Vineyard.—Some of the early varieties are coming away strongly.

Both the orchard and vineyard have been ploughed, cultivated, and harrowed during the period under review.

General.—The live stock look well, there being a little herbage in addition to the dry grass on the flat country, which no doubt accounts for the fact. Nevertheless, rain is required, as the dry feed is becoming scarce. A few applications have been received for "Teff grass" seed and "Earth nuts," which have been supplied. The round timber for the hayshed additions has been obtained, and 13 of the 20 required for the stables as well. All necessary work, such as chaffcutting, chipping, &c., has been carried out as the opportunities to do so presented themselves.

WARREN.

Report for the month of August:—

Weather conditions for the month of August proved very dry, no rain having fallen. Farmers round this district are suffering badly for want of rain, most of the pastures affording very little fodder for stock.

The chief operations on this farm at present are prickly-pear eradication, land-clearing, and harvesting of the winter cereals. This farm is the only one in the district with a crop growing on forest country in spite of adverse weather conditions, clearly showing what proper cultural operations mean in order to secure a good crop. The conservation of moisture in the soil by means of proper cultivation is a subject to which most of our farmers pay insufficient attention.

The results of this year's winter crop are shown as follows:—

Californian Feed Barley.—This was sown on the 27th March, under favourable conditions, at the rate of 48 lb. of seed per acre. The crop

thrived well in its early stages, but during dry weather was checked in growth considerably. This was due to the shallow rooting habits of the plant, the rootlets not reaching deep enough to obtain moisture. The ears filled well, the grain being large and plump. Feed barley is not recommended for this district, the weather conditions being much too severe.

La Huguenot Wheat.—This wheat was planted on the 28th March under favourable conditions. La Huguenot is a wheat of the macaroni type, being a selection from Bald Medeah. It is essentially a hay wheat, the grain being much too poor and unsuited for milling purposes. Unless planted very thickly, it grows very coarse and rank, but when sown at the rate of 68 lb. per acre, as was done here, it makes an excellent hay crop. This variety proved excellent for this district, standing dry weather, and showing no signs of rust. The flag was thick, but on the coarse side. The yield per acre was very heavy, and the heads well filled with grain.

"Thousandfold" Rye was planted on the 4th April. This received little rain, but grew luxuriantly, attaining the average height of 5 ft. The grain was well filled, but the flag on the stalks was very thin. Rye grows well in this district on practically any class of land.

Famer's Durum Wheat was sown on the 25th April, and grew well. The flag was very thick and fine, and the heads filled well. This is a bearded wheat of the macaroni type, and is suited to our dry conditions, but on account of the awns, which are detrimental to first-class hay, will not be grown largely nor be favoured here.

Kubanka, another bearded wheat, was sown on the 25th April, and thrived well under dry conditions, but did not attain much height. Flag nice, bright, and clean, and heads well filled with good grain. This variety was slightly affected with rust and smut.

Cedar and Zealand Wheats were sown fairly late in the season, and, owing to exceptionally dry weather, did not come to much.

Wheats are grown here for hay only. It is found that the milling wheats do not grow well, the grain being very pinched and the crop affected by rust.

Clearing operations are still being carried on with the aid of high-power explosives. Demonstrations have been given to different farmers to show the value of this cheap and effective way of clearing land.

Dairying operations have resulted in an increased supply of cream for the factory. The cows have been grazed on wheat and lucerne, and, as a result, the milk supply has materially increased. The natural pastures are now too dry for dairy cows, but afford plenty of feed—sufficient to keep all the stock in their usual splendid condition.

Cultural operations are being carried out, and a prosperous summer season is looked forward to.

[Photographs showing wheat crops and harvesting operations arrived too late for insertion in this issue, but will appear in the Journal for November, meanwhile they will be utilised in the Annual Report of the Department.—Ed. "Q.A.J."]

The Manager (Mr. T. Jones) supplies the following information in connection with the live stock on the farm:—

The horse season has now commenced, and people may wish to know the pedigree of our Clydesdale horse.

PEDIGREE OF CLYDESDALE STALLION, "SIR GEORGE," (1295). New Zealand Draught Horse Stud Book; also entered in forthcoming volume of New Zealand Clydesdale Horse Society's Stud Book. *Foaled*: 12th December, 1910. *Bred by* Mr. Thos. Blackley, Riverina, Rakia, Canterbury, New Zealand. *Sire*: Sir Talbot (11544), by Lothian's Best (10374); dam, Cherry Ripe (14414), by Royal Signet (8967); 2nd dam, Cherry Bud, by Knight Errant (4483); 3rd dam, Young Cherry of Culdees (9133), by Sir Gordon (4018); 4th dam, Cherry of Culdees (2984), by St. Colme (7383); 5th dam, by Lochbrow (2225). *Dam*: Burnside Primrose VI. 1159, N.Z.S.B.), by Marshall Keith (7046); 2nd dam, Primrose (564), by Roseberry (780) or Elgin (117); 3rd dam, Emma by Darnley (222); 4th dam, by Young Campsie. Sir Talbot was bred by R. T. N. Speir, of Culdees, Muthhill, Perthshire; and was imported by the New Zealand Government. His sire, Lothian's Best, was bred by Messrs. R. and R. Percival, Burgh-by-Sands, Carlisle; and was by Lord Lothian (5998); dam, Flash Girl (13233), by Flashwood (3604); granddam, Luna (7357), by The Maister (1840); great granddam, Cause Way End Jean (790), by Emperor, by Comet (195); g.g. granddam Jess, by Defiance (225). Burnside Primrose VI. was bred by the late Wm. Boag, of Burnside, Canterbury, New Zealand. Her sire (Marshall Keith) was bred by Mr. James Argo, Crannabog, Rothie Norman, Aberdeenshire, and was by McCamon (3818), by Blue Ribbon (1961); dam, Darling II. (4378), by Ivanhoe II. (399).

The following information may also be of interest to Ayrshire breeders:—

Our champion Ayrshire dairy bull, "Spectator," died on the 1st of May last; and we were left without a matured sire in our Ayrshire stud. However, a young bull of good pedigree had been well reared, and reserved for home use. This one I have named "Noami's Arthur." His sire is Arthur Lytton; sire of sire, Auclaubrain Arthur, 7535, A.H.B. of S.; dam of sire, Tower Bess 4th, 25969, vol. 34, A.H.B. of S. His dam is Naomi of Wanora; sire of dam, Speculation or Whitehill (imp.); dam of dam, Ruth, No. 178, Q.D.H.B.; granddam of dam, Ream Ruthie of Glen Elgin, by Gordon.

Tower Bess 4th was one of the heifers purchased in Scotland by the late Principal of Gatton College.

I have received some tempting offers for this young bull, but thought it would be wise to keep him for home use.

Breeders will kindly note the new blood introduced by using this bull.

Plate 67.—"Sir Hugh," Champion Ayrshire Bull of Scotland.
The Property of James Howie, Esq., Kilmarnock.

ERADICATING WATER WEEDS FROM IRRIGATING DITCHES.

Discing canals while the water is running is reported as a successful means of eliminating growth of water weeds in the Bear River and Cache Valley projects in California. An ordinary disc harrow is stripped of its seat and double trees and the tongue is cut 4 ft. in length. To this are hitched two ropes, leading to teams, one on each bank; by adjusting the length of these ropes the harrow can be run on either slope or on the bottom. This digs up the roots and the plants float down and are removed. The above canals were very foul three years ago when Mr. Whelan, the manager, introduced this system; now very few weeds are left. It is cheaper than mowing, and it does not interrupt the flow of water.—"Monthly Bulletin."

[Many of the bore drains in our Western country are choked with bulrushes. The above suggests that it would not be difficult to eradicate them.—Ed. "Q.A.J."]

The Orchard.

ORANGES AT CLERMONT.

We have previously had occasion to make mention of the suitability of the Clermont district for the production of citrus fruits, and our illustration and description of oranges grown at the Racecourse Garden by Mr. G. Barraclough bears out this opinion. The fruit was exhibited at the Clermont Show in June last. On the upper right hand side of the photograph is a bunch of the well-known Glen Retreat mandarin, alongside another bunch of six of which the grower does not know the name. The trees producing the latter were grown from seed sown thirty-five years ago. All that can be said about them is that they are some of the finest oranges he has ever seen, having a pineapple flavour. There are 500 of these trees in the grove, and these are said to be the pick of them. All have been irrigated by steam power, and, in spite of a very dry year, the Glen Retreats are the best ever produced on the property. The mandarins averaged 10½ in. in circumference, and the oranges 11½ in., some being somewhat larger, but none smaller.—[The unnamed oranges may be Grape fruit.—Ed. "Q.A.J."]

HOW TO KEEP ORANGES FOR SUMMER USE.

Mr. Geo. Quinn, the Government Fruit Expert, South Australia, gives the following instructions for keeping oranges for summer. Mr. Quinn has kept them for months by the following plan:—"First, you must select good fruit on the tree, and cut it carefully, leaving a piece of the stem on the fruit. The rind must not be even scratched. Place the fruit in a room on a table or shelf where it will get plenty of fresh air, but not a draught, for a few days, so that the rind may toughen. Then get a shallow box, say a foot deep, and put a layer of bran on the bottom. Wrap tissue paper around each orange and place them about an inch apart. Put another layer of bran on, and another layer of fruit, and so on. Keep the box in a cool cellar, and if the atmosphere is moderately moist the fruit will remain fresh and good for a long time. Should the atmosphere become dry, a little water should be put on the floor, and the evaporation would produce the necessary moisture. Excellent results can be assured by the use of fine dry sand, but I have found that bran is better, because it is not so heavy. Lemons can be treated in the same way, but they will keep for a year if merely wrapped in tissue paper and put on a shelf in a cool cellar."

Plate 63.—Oranges and Grape Fruit Grown at Clermont by Mr. G. Barraclough.

MANURING PINEAPPLES.

Mr. F. Fairley, who grows a considerable area (26½ acres) of pineapples at Woombye, has studied the subject of fertilisers for this class of fruit, and, in order to save time and ensure accuracy, has designed a chart for his own use; and, believing that it might be of service to other

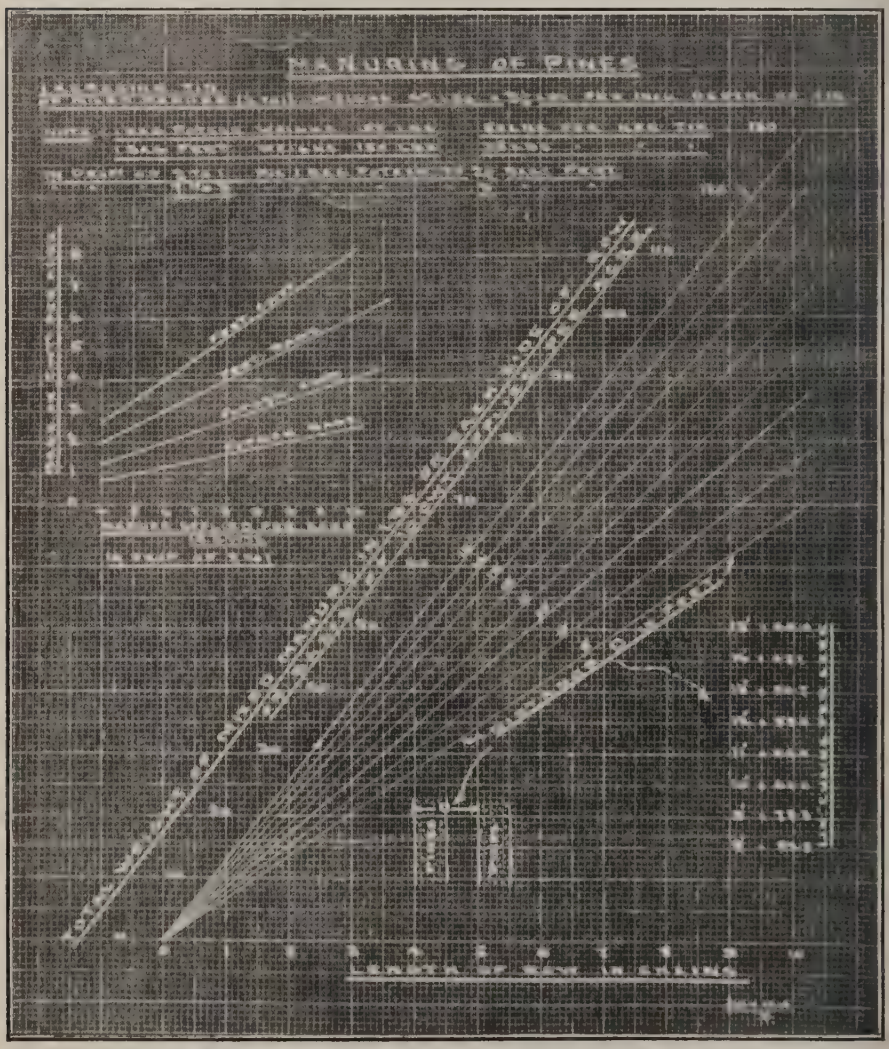


PLATE 69.—CHART FOR MANURING PINEAPPLES.

pineapple-growers, he has forwarded us the illustration herewith. It gives all the necessary data required, and the following explanation of how to use the chart should prove of interest and value to others engaged in the same branch of fruitgrowing:—

EXPLANATION OF CHART.

The quantity of manure to be applied to each side of a row of pineapples, in order to give them a given dressing in cwts. per acre, depends upon the distance the rows are apart.

Therefore, measure the distance in feet from the inside of one row over the top of the pines to the next row, as per diagram on chart.

Supposing this distance (D) is found to be 12 ft. and the average length of rows to be manured is 5 chains, run the eye up from 5 chains at bottom of chart until the 12-ft. diagonal line is met, and at right angles to this it is seen that 51 lb. of mixed manure must be applied to each side of a row on the basis of 10 cwt. per acre. If 7 cwt per acre is to be applied, take seven-tenths of this amount, *i.e.* ·51 x ·7 = 35.7 lb. If 12 cwt. per acre, 1·2 x 51 = 61·2 lb. on each side of row.

If it is required to know what quantity of manure should be ordered for a given patch of pines—supposing as above the distance of rows is 12 ft. and the average length of rows is 5 chains, and there are 15 rows, then 15 x 5 = 75—look in right-hand margin of chart, and it will be seen that for 12 ft. between pines 55 lineal chains run to the acre; therefore, as we have 15 x 5 = 75 lineal chains to manure, the area is $\frac{75}{55} = 1{\cdot}36$, say 1·4 acres.

Now look at small chart on top left-hand corner of diagram, and under 10 cwt. per acre (amount required) it will be found that for each acre 2 bags of potash, or 3·3 cwt., and 5 bags of fertiliser, or 6·7 cwt., will be required. As there are 1·4 acres in this patch, 2 x 1·4=2·8, say 3 bags of potash, or 4·6 cwt., and 5 x 1·4 = 7 bags of fertiliser, or 9·38 cwt.

Proof—

9·38 cwt. of fertiliser
4·60 cwt. of potash

13·98, say 14 cwt. $\frac{14}{1{\cdot}4} = 10$ cwt. per acre.

For mixing the manure—as one bag of potash weighs (approximately) 187 lb. and one bag of fertiliser (approximately) 150 lb.—if it is desired to mix the manure in the proportion of 2 of fertiliser to 1 of potash, mix together 1 bag of potash and 2½ bags of fertiliser. If a 7 to 3 mixture is desired, mix 1 bag of potash with 3 bags of fertiliser.

For weighing out the manure to be applied to each side of row, if scales are not available, a kerosene tin may be used as explained below.

A kerosene tin filled to within 1 in. of the top (to allow for a handle) with potash weighs 50 lb., with fertiliser 38 lb., and with mixed manure in the proportion of 2 of fertiliser to 1 of potash weighs 42 lb.

The depth of a kerosene tin within 1 in. of the top is 13 in., which, therefore, gives 3¼ lb. of mixed manure per inch depth of tin as measured with a foot rule.

The following table gives the approximate weight of mixed manure according to depth of tin:—

Kerosene Tin.

1 in. deep of mixed manure =	3¼ lb. (approx.)
2 in. deep of mixed manure =	6½ lb. (approx.)
3 in. deep of mixed manure =	9¾ lb. (approx.)
4 in. deep of mixed manure =	13 lb. (approx.)
5 in. deep of mixed manure =	16¼ lb. (approx.)
6 in. deep of mixed manure =	19½ lb. (approx.)
7 in. deep of mixed manure =	22¾ lb. (approx.)
8 in. deep of mixed manure =	26 lb. (approx.)
9 in. deep of mixed manure =	29¼ lb. (approx.)
10 in. deep of mixed manure =	32¼ lb. (approx.)
11 in. deep of mixed manure =	35¾ lb. (approx.)
12 in. deep of mixed manure =	39 lb. (approx.)
13 in. deep of mixed manure =	42 lb. (approx.)

N.B.—In the weights given, the fertiliser was meatworks fertiliser (dried blood and bones), from Messrs. Birt and Co., and the potash was sulphate of potash supplied by the Potash Syndicate of Sydney.

REPORT ON PERENNIAL RICE.

By C. E. WOOD, Manager, Kamerunga State Nursery.

Seed of perennial rice was received 8th April, 1913. In a small plot, only one plant grew.

Seed received 13th December, planted 14th January; germination very fair. Growth: Slow at first; began to spread by means of its running roots after about two months; height in five months, 3 to 4 ft. Weeds: Owing to hot and wet weather, weeds grew fast, and hand-weeding in rows was necessary; weeds persisted to a certain extent even when the rice attained its full growth. Flowering: Fair; flowering stems being 5 to 7 ft. high. Seed: Very few seeds appeared to mature, and those were hard to winnow by hand on account of the long awns. Only 4 oz. were procured off six rows, each row being 1 chain long. The seed was planted in drills 15 in. apart. When mature, all the blades became spotted with brownish marks, and a sample was sent to the Department for examination, but I understand from Mr. Tryon, whom I saw at the Brisbane Exhibition, that it is nothing dangerous. The plot was cut out in the beginning of July, and now, three months later, little or no growth has taken place, whereas weeds are growing. From this it would appear that both hot and moist conditions are required to make it a success, and I should not be surprised if, in its wild state, it grew in wet or swampy ground.

Horticulture.

ON SEEDS.

At a recent meeting of the members of the Charters Towers Horticultural Society, Mr. M. Purdon, head master of the Millchester State School, read a very interesting paper on "Seeds," which we regret was mislaid in our office, but which, none the less, will prove useful to horticulturists notwithstanding the delay in its publication. The paper was as follows:—

SEEDS.

Every plant possesses what may be termed a life-history—that is, its life has a beginning; it passes through certain stages, and age comes on, and finally it dies.

In all the higher plants the life-history commences with the germination of the seed, continues as that of the seedling, is prolonged as the plant becomes mature, then flowering takes place, seeds are produced, the death of the parent ultimately takes place, and the continuity of the race is kept up by the young plant in the seed.

Plants, then, produce seeds, not, as has sometimes been said, for the use of animals but to provide for the continuity of their particular race or kind.

PARTS.

All seeds consist of two principal parts—a covering and a living part within it.

The covering may consist of two layers—an outer called the testa, and an inner called the tegmen. Many seeds have only one layer—the testa.

The living part is the plantlet or embryo, and is in fact an immature plant, having a separate existence from that of the parent.

The plantlet consists of different parts, each part serving a different purpose. In the bean it consists—(*a*) of two thick masses called cotyledons, or seed-leaves, placed face to face, and united at one part of their margins. (*b*) A small cylindrical-shaped body lies between these cotyledons or seed-leaves where these unite and is attached to them about its middle. It is conical at one end and blunter at the other.

When the seed germinates the conical end, called the radicle, grows downward, and gives origin to the root of the plant.

The other end, called the plumcule, which lies between the cotyledons, grows upward, and is the bud of the stem of the plant.

This elongation of the plumcule and radicle is the first growth made by this well-known plant.

The cotyledons or seed-leaves of the bean supply nourishment to the growing radicle and plumcule, which absorb it through the points

of attachment; after this, their nourishing matter being exhausted, the seed-leaves shrivel up and rot.

In a grain of wheat the plantlet lies on one side of the seed, between the covering and the albumen, which is white and floury.

It has not two opposite seed-leaves or cotyledons like the bean, but one.

When germination begins, the pluncule and the radicle, not being in organic connection with the albumen, absorb nourishment from it by contact, and not as in the case of the bean, which obtained its nourishment from its seed-leaves.

The presence of one or two seed-leaves is the basis on which botanists divide flowering plants into two classes—the Monocotyledons having one seed-leaf and the Dicotyledons having two seed-leaves. Many common garden plants have two seed-leaves—as the cabbage, lettuce, and beet—whilst the lilies and grasses have one seed-leaf.

GERMINATION.

The early stages of the development of the embryo are spoken of as germination.

In order that a seed may germinate the following conditions are necessary:—

(*a*) It must be alive.
(*b*) It must have warmth.
(*c*) There must be a certain amount of moisture.
(*d*) It must have a supply of air.

In connection with germination, we should remember that samples of the same kind of seed of different origin often differ in their period of germination. These variations may be due to peculiarities in the seed, such as age, ripeness, and nature of the seed-coat.

In the case of large seeds, which contain a large supply of reserve food, the seedlings begin to take in food before the reserve supply is exhausted, but in the case of the smaller seeds the reserve supply is sometimes exhausted before the roots and leaves are sufficiently developed to carry on their work properly, when the plants either receive a temporary check or die. This is likely to happen when the seeds are planted too deeply, as in that case the reserve food may be exhausted in developing a shoot long enough to carry the leaves above the surface.

PLANTING OF SEEDS.

In connection with the planting of seeds, we must bear in mind that Nature's laws demand that certain conditions must prevail, or we cannot expect favourable results from our seed-sowing. We might, in fact, say that the seeds are little autocrats, who insist upon all the necessary conditions being present before they will make from their dormant state, and burst forth into buds.

For example, if pansy seed be planted in the garden during hot, dry weather, not one seed in a hundred will germinate, but if the same quality of seed be planted in a seed-box, frame, or bushhouse, say, in

April, it is very likely that the seeds will quickly germinate and be ready for transplanting in a few weeks.

Again, if seeds of gloxinia and cineraria were sown in the open, very few, if any, would germinate.

Even when sown in a frame, seed-box, or in the bushhouse, many of our choice seeds require special care, and we should be very careful before blaming the seedsman for supplying us with inferior seed to see that we ourselves are not to blame for not carrying out the conditions necessary for the germination of these seeds.

Some of the points to be kept in mind in connection with seed planting are:—

(*a*) The proper time to sow the seed. All plants have their season of growth, and if sown at the wrong time they will not germinate. Sunflower, zinnias, calliopsis, and others of our well-known annuals are prolific seed-bearers, and invariably produce plants from self-sown seed, but these seeds remain dormant in the soil until the conditions necessary for their germination take place. Therefore, if these seeds are planted at the wrong period of the year they will not germinate until the required conditions are present. English annuals—such as candytuft, dianthus, phlox, pansies, &c.—should be sown during April, so as to avoid the great heat of the preceding months, and also the heavy rains which sometimes fall during those months.

(*b*) The next point of importance is the proper soil to sow the seed in. A good soil for sowing seed in consists of equal parts of sand loam and leaf mould, with a mixture of fine silver or coarse sand.

(*c*) The next point is the manner in which the seed should be sown.

Some growers prefer sowing theirs in a glass frame, others in seed-boxes or seed-beds, and where a small number of plants is needed in an earthenware seed-pan.

THE SEED-BOX.

Get a shallow box about 4 or 5 in. in depth, in which a number of holes have been made in the sides and bottom. Place in this to a depth of about 2 in. good draining material, as broken rocks, coal ashes, &c. Now fill up to within half an inch of the top of the box with your prepared soil, and press the soil firmly and evenly with a board or anything having a smooth, even surface; and now place some fine sifted soil on this, and give the soil a thorough watering.

Sprinkle the seeds firmly and evenly on the surface, and if the seeds are very fine press them into the damp soil. If the seeds are a fair size sift on a little more fine soil before pressing. Some growers prefer sprinkling some fine silver sand, and on this a light covering of thoroughly dried manure. The sand tends to keep an even moisture about the seeds, and the manure prevents caking.

If the soil was properly soaked before planting, no water will be required until the seeds germinate. If by any means the soil has become dry, either water by immersion or use a water-can with a fine rose.

A good rule in sowing seed is to remember that the smaller the seed the lighter the covering should be.

A sheet of glass placed over the box will tend to prevent evaporation, and also to maintain an even temperature. When the seeds have germinated the glass should be tilted to admit air, and should then be gradually removed.

Place the seed-boxes where they will be protected from the afternoon sun. It is necessary to protect the boxes from the forenoon sun, too, by covering the boxes with some light material until the seeds germinate. Then gradually harden the young plants by gradually removing the covering, so that when they are planted in the open beds the change will not be too severe.

It is necessary that all nursing-beds and seed-boxes be protected from heavy rain and hot or cold winds.

TRANSPLANTING.

It is advisable to choose, if possible, a showery day for transplanting seedlings. Have the soil well damped, and the holes should not be made until the young plants are ready to go in. Make the holes with a pointed stick, and press the soil firmly about each plant, being careful to lift as much earth as possible with the seedling, and plant it to about the same depth as it was in the seed-box.

When transplanting young seedlings into the open beds put about a handful of well-rotted farmyard manure, well mixed with fine soil, under each plant, and if warm weather sets in protect the plants from the sun with two or three small branches, and keep well watered.

SELECTION OF SEEDS.

"The best seed obtainable is never too good" is a safe rule to adopt when sowing in the garden or in the field. Avoid cheap seeds. They may or may not be good. The same amount of time and labour is required for both, but the results are very different.

It is absolutely necessary to sow good seed if we wish to raise good plants. A good seed, and especially a good seed from a good plant, will invariably produce a better plant than an inferior one will produce. Seed for sowing should always be selected from the best plants.

In connection with what can be done with carefully selected seed, careful testing of the seed and intense cultivation, I might mention that a few years ago a Boys' Corn Club was formed in some of the Southern States of the United States of America, and prizes were given for the most successful results. In the year 1910 more than 46,000 boys entered for this competition, each boy being allowed 1 acre of land. The winner turned up in a lad 12 years of age, and he succeeded in producing the enormous quantity of 228 bushels of maize from his acre plot. Another lad, the son of a country minister, succeeded, with the prizes he won at State and county fairs, and the price he received for his crop, in making just £200 profit from his acre plot.

Another lad whose father knew all about maizegrowing—or, rather, thought he did—obtained 84 bushels from his acre plot, while his father's crop from land enclosing his son's land on three sides averaged 19 bushels. I might mention that the average for the whole of the United States was about 25½ bushels.

These record crops of maize mean a great deal to the boys, for the corn sells as seed corn in their districts at several times the market price for ordinary maize.

Probably as they grow older some of them will turn their attention to the raising of seed-corn altogether.

DISTRIBUTION OF SEED.

At the beginning of this paper I mentioned that plants produced seeds in order to provide for the continuity of their particular race or kind, and Nature has provided means for distributing these seeds in many ways. Just as the perfume, shape, and colour of flowers have to do with the distribution of pollen, so the colour, shape, and texture of fruits have to do with the distribution of seeds in their native state.

1. The seeds of fruits may be scattered by the wind. The seed of fruit has often wing-like appendages which enable the wind to blow the seeds away from the parent plant. The Scotch thistle and the common sow thistle are well-known examples of this method.

2. The seeds of some plants are scattered by clinging to animals. It is in this manner that the seeds of the Bathurst burr and the Noogoora burr are spread far and wide in South Queensland.

3. Succulent fruits, such as cherries and gooseberries, are eaten by birds. The undigested seeds are carried away and dropped, and so the plants are spread. The well-known prickly pear is a familiar example of this method. In some parts of Queensland the emu has been the means of spreading this plant over large areas. The lantana, another noxious plant, is also spread by birds eating the fruit and dropping the seeds.

4. The fruit of some plants opens with a jerk, and the seeds are ejected some distance from the parent plant, as in the Balsam.

5. Then, again, seeds and fruits are spread by artificial means.

The seeds of many noxious plants have been introduced into this country in the straw packing of cases of merchandise, and also in fodder, and having found a suitable soil and climate thrive here to our farmers' and graziers' very great annoyance.

His paper, he concluded, was chiefly written on experience gained in a fertile district in the South with regular rainfall and good soil, while here the rain was in the first half of the year, and the soil clayey, and if watered on the surface became as hard as a brick. The conditions were absolutely different here.

The paper was greeted with loud applause. The president expressed the thanks of the society to Mr. Purdon for his paper, and asked for discussion.

Tropical Industries.

COTTON CULTIVATION IN UGANDA (E.A.)

In Uganda the Department of Agriculture is constantly at work on the improvement of the staple of the progeny of American Upland seed imported into the country in 1910, and issues the best seed available to cultivators. The whole seed supply is under the control of the Department, and only seed issued by, or approved by, the Department may be sown.

As to the planting seasons in the Protectorate, these are so variable and local as regards rainfall that no definite time can be fixed for the sowing. The general sowing season extends from April to July, according to the occurrence of rain. In one district (Teso) the Department has introduced a system of double sowings. Each native cultivator has two plots, one of which he sows in April or May, and the other in June or July, thus ensuring that at least one of his plots adapts itself to the vagaries of the season. In a favourable year, both his plots may do well, and he profits accordingly.

In Queensland, on the contrary, there is one time of the year for sowing cotton, and that is in August or September, according to locality and liability or otherwise to frosts. It may be noted that Uganda lies on the Equator, whilst Queensland extends from about 10 degrees S. to 28 degrees S. of the Equator. Hence the seasons south of the Tropic of Capricorn are, as a rule, fairly regular, and no second planting is needed. By sowing in August or September, or even later, the crop will be ready for picking in January or February, and the picking may extend over several months, say, up to May or June, when frosts may be expected. The pickers in East Africa are provided with two bags, or rather a bag with two pockets, so that the clean and dirty cotton may be kept separate. This method might be adopted with advantage in our cotton fields. The admixture of dirty cotton or of damaged bolls discounts the value of the cotton to the purchaser, although he pays full value for clean seed cotton.

A considerable amount of cotton is grown in the German colonies of Africa, and of the Pacific Islands, and there is no reason, climatic or even economic in respect to labour, why Queensland should not this year plant cotton largely. Owing to the present European war, cotton cargoes from German possessions will dwindle to vanishing point, and it may be that, as was the case during the civil war in the United States, the opportunity for the expansion of the industry in Queensland, if seized now, will once more turn to the advantage of our State and possibly result in a permanent revival of cotton-growing, less in degree.

of course, than the boom during the American war, but sufficient to establish cotton-growing as one of the staple industries of the State, and may further lead to the erection of many ginneries and cotton-mills, as well as of oilmills.

THE CULTIVATION AND CURING OF GINGER.

For the information of several correspondents who last month wrote asking for information on the cultivation of ginger, we republish the following article on the subject which appeared in the issue of this Journal for April, 1906:—

GINGER.

Here we have another article which is in universal demand, and for which good prices can be obtained. Ginger grows to perfection in any suitable soil on all the coastal lands of the State. There is no more difficulty in growing ginger than in growing arrowroot, peanuts, castor oil, or sunflowers. There is, to be sure, a considerable amount of light labour required to prepare the rhizomes for market, but the preparation is so easy that it can be done by girls and boys.

Two essential requirements for the growth of the plant are—sunshine and moisture. These conditions are found in Eastern Queensland. The process of planting differs little from potato-planting. A "finger," containing an eye or embryo, is planted in holes or trenches a few inches beneath the surface, about 1 foot apart. All that is needed is to keep the ground clean, and the young plants well watered, the soil being, of course, well drained, because stagnant water gives rise to black rot, and in this condition the root fills with water, swells, has a bad smell, and is then attacked by insects and worms.

The very highest quality of ginger is produced on deep, rich, black scrub or virgin forest soil. It can be grown year after year on the same ground, and when the soil becomes too poor to grow "white ginger" an inferior variety—the blue—will yield good crops.

More depends on the curing of the ginger than on the soil, and regularly shaped "hands," as the roots are called, command the highest price in the market.

Planted in October, it is ready for digging in July or August. When the stalk withers it is ready for harvesting. In digging out the roots they must be carefully turned out with a fork without bruising or breaking the hands. These hands are divested of fibrous roots and of all adhering soil, and this must be done as soon as they are dug, for, if allowed to dry with soil, &c., adhering to them, the ginger will never be white. After cleaning, the roots are thrown at once into water, and are ready for peeling.

The peeling is an art easily learned. As the oil cells on which the aroma of ginger depends are close to the surface of the root, the peel must be very thinly taken off with a narrow-bladed knife. As fast as the

roots are peeled they are thrown into water and washed. A very little water will serve to wash a great deal of ginger. The roots remain in the water all night. Limejuice in the water will give a whiter root. By using boiling water the peel comes off easily, and what is known as black ginger commercially is produced.

After washing, the roots are dried in the sun on mats or boards laid on the ground. They are exposed at sunrise and turned over at midday. At sunset they are taken in or carefully covered, as rain or dew causes mildew. It takes about six or eight days to thoroughly dry them. When dry they are graded or sorted. The highest grades are large-sized hands of light, uniform colour, free from evidence of mildew. This grade is very brittle and cracks easily, but they must not be broken, or the value is depreciated. There are generally four or five grades, that which is shrivelled and small being in the lowest. The dark varieties form another; the heavy, tough, and flinty, a third. These four are finally assorted by placing hands which are small but of good texture and colour as one grade; the larger-sized, well-bleached hands are placed in the highest grades. The finest hands will range in weight from 4 to 8 oz. Ginger is always packed in barrels for shipment.

As to yield and profit of the ginger crop, these depend, like all other soil products, on soil, rainfall, sunshine, planting, care, and curing. An average yield can be estimated at from 1,000 to 1,500 lb. dried ginger per acre; 2,000 lb. have often been obtained.

Prices for ginger vary. As much as £10 per cwt. is often paid in the London market for the very highest class of white ginger, but the usual market price to-day averages all round from £2 2s. to £3 10s. per cwt. for Jamaica ginger, the same for Cochin, and 18s. to 18s. 6d. per cwt. for Japanese.

Now in all this there does not exist a single reason why ginger should not be grown by any farmer who has suitable soil in a suitable locality, and especially by those who are blessed with a family of boys and girls. Think what a lot of ginger they could prepare of an evening sitting round the fire on an August night, in the same way as forty-five years ago the farmers' wives and children and the farm hands used to prepare arrowroot, grating the roots into tubs and buckets on graters made of kerosene tins. Arrowroot was worth from 1s. 6d. to 2s. per lb., and it paid to prepare it by hand. How much better would it pay to prepare ginger, so easily grown, so prolific, so easily cured, due care being exercised, and for which, in the United States alone, there is an annual demand for over 3,000,000 lb., leaving Great Britain and other European countries out of the calculation.

THE COST OF MAKING COPRA.

SOME ACTUAL RETURNS FROM CEYLON.

Those interested in coco-nut culture who wish for actual facts as regards returns should study the report of the Chilaw Coco-nut Company, of Ceylon, for the year ended 31st December, 1913, especially as the estate is old-established, consisting of two estates (Walahapitiya and Letchmey) with a total acreage of 1,100 acres, made up as follows:—

Acres.	Years Old.
200½	29 to 34
400½	22 to 23
43	20 to 22
50	19 to 22
100	15 to 19
100	14 to 18
84	9 to 14
50	8 to 13
56	7 to 10
11	Jungle
5	Paddy

Unfortunately, we are not told how many trees go to the acre, or what the total number is.

From this area they secured 2,252,334 nuts (thanks to plentiful rains in 1912), whereas last year, in August and September, supplies of rain were short, so that during these same months this year (1914) a shortage is expected; otherwise, it seems, the output is well ahead (385,000 nuts) of last year so far, against 1,774,964 nuts in 1912. Of last year's output 37,492 nuts, or 1·66 per cent., were rejected (what actually became of these is not stated) and 7,436 were sold as seed-nuts. The balance (2,207,406 nuts) produced 2,008 candies (at 560 lb., or ¼ ton, to candy = 500 tons). The chairman called attention to the fact that it took only 1,099 nuts to the candy (4,396 to the ton), against 1,254 nuts in 1912 (5,016 to the ton), which reduction in the number required is put down to the good rainfall in 1912 giving weightier nuts last year. All this reminds us of our troubles, when writing our book on "Coco-nuts," to find out exactly how long it takes between the time that the trees first flower and when the nuts are ready for picking—a point we are fortunately able to fully discuss in the second edition (pp. 590-593), where, as shewn by the Chilaw Report, it should take about twelve to thirteen months. Now, the 2,008 candies cost Rs. 24·02 to produce (say, 128s. per ton), including Rs. 12·04 (64s. per ton), or just half, for manuring. If these figures are correct, the proportionate cost of manuring is high—£1,600 for 1,100 acres or, say, 30s. an acre (the cost of picking, drying

copra, &c., the same); but at the same time it pays and pays well, since that which cost Rs. 24 to produce, including the Rs. 12 for manuring, sold at an average price of Rs. 96·47, or four times the price, and, although values are now lower, a forward contract was made for the sale of 2,000 candies during 1914 at Rs. 95 per candy for No. 1 copra. Meanwhile those who shirk adequate cultivation and manuring should note that this estate, through the chairman, prides itself on the fact that its lands are clean, and that a careful system of husbandry has been pursued throughout this and last year, and as a result the palms are in an excellent and healthy condition, and the output this year, so far, is ahead of 1913.

Here, then, we have three important facts, viz.:—It costs in Ceylon on a well-managed estate Rs. 24 a candy, or 128s. a ton, to produce copra, of which expense half is incurred in manuring the palms, and that the copra realised an average price during 1913 of Rs. 96 per candy, or £25 12s. a ton in Ceylon; that after a good year of rain 4,396 nuts are sufficient to make a ton of copra, whilst a less heavy year can increase the number required by 15 per cent. Such details are worth noting, since we are told an ounce of fact is worth a pound of theory.—"Tropical Life."

PADDY (RICE) FOR THE DISTILLERY.

Mr. J. F. Keane, Carbeen, writes us as follows on the use of Paddy for the manufacture of spirit fuel:—

"In 1888 I made a voyage to Japan from Europe in the s.s. "Chateau Leuville," a very fast, old, erstwhile French mail boat. We cruised entirely round the two islands and through the inland sea, picking up Paddy at every port we came to. We took about 5,000 tons of it to Holland to be used in the making of square gin. I was informed that the insoluble constituents of the grain would be converted into pulp for cigarette paper and the chaff into wrapper paper. We discharged about 100 tons damaged, on account of the long passage, 55 days, but I was told there would be a profit even in that as a size for rope and textile fabrics. I should think Port Darwin must be some 5,000 or 6,000 miles nearer to Amsterdam than Nagasaki. Wild rice, I am almost certain, is typical—grows right across North Australia from the Pacific to the Indian Ocean. Nothing is more certain than that if it can be shown that any foodstuff or merchantable commodity can be more economically and abundantly produced in one place than it can in another, money will find its way to it if it has to precipitate a great European war in order to do so. Coloured labour cannot compete with the combined harvester. There were some thousands of Chinamen in South Australia thirty years ago. They fled almost to a man before the wheat stripper."

Entomology.

THE MAIZE MOTH INJURING CUSTARD APPLES, ETC.

In response to a letter received by the Department of Agriculture and Stock from a resident of Woodford, who makes a study of fruit and vegetable insect pests, with reference to the damage done to many fruits such as the custard apple by the maize moth, the Government Entomologist, Mr. Hy. Tryon, has prepared the following valuable report on the subject:—

The insect that Mr. F. Wise refers to in his communication of 17th instant as injuring the custard apple and many other fruits is evidently the caterpillar of a moth named *Dichocrocis punctoveralis*. No special pamphlet has been written regarding this pest, but it has been incidentally referred to in more than one publication and received a somewhat extended notice in a report, "Insect and Fungus Pests," issued many years since and for a long time altogether out of print.

The main facts regarding it are, that it not only attacks the custard apple, but also the fruits of the following trees:—Peach, orange, papaw, loquat, castor oil, &c.; the pods of certain bean plants, and the cobs and stalks of maize, and also the stems and heads of millet. In the case of the papaw, it not only is partial to the fruit, but it also very seriously injures the stem, especially in the neighbourhood of its apex, and in addition to other food plants mentioned, it also damages cotton, tunnelling into both "bolls" and young shoots.

It lays its eggs singly on the plant destined for attack, and generally in some part more or less sheltered, as in the axils of leaves, and in places where fruit is in contact with fruit or foliage. There are at least two broods of caterpillars during the summer months. During the winter the insect remains as a caterpillar, not changing to a chrysalis until the cold weather has passed away. It commonly crawls out of its tunnel in the fruit, &c., to pupate, but, as a rule, does this after travelling but little. The moth is a night flyer, but is not attracted by light. In appearance it is orange, black-speckled, and measures about ¾in. across the expanded wings.

It has been found very difficult in practice to deal with it, since it can derive its sustenance as a caterpillar from so many sources. However, some benefit has been found to result from assailing it during the winter months, when it leads a more or less inactive life as a caterpillar, in sites where previously it has been exercising its destructive habits. In attacking it, then, all rubbish that may harbour it should be sought out and destroyed, *e.g.*—(1) dry, shrunken and blackened peaches that, as commonly happens, may remain upon the trees long after the

fruit has been destroyed; (2) maize cobs and maize stalks, that injured by and still harbouring the insect are, under ordinary circumstances, left for weeks often in the field after they have been severely damaged and are already dead or dry; so also (3) with respect to the "bolls" and stalks of cotton plants. Indeed, it should be an object to seek out all sites of the occurrence of the caterpillars and destroy them so as to reduce the numbers that otherwise they would give rise to. On the eggs hatching, the tiny grubs may remain a short time feeding externally before mining into their food-plants. This permits their being assailed by insecticides such as Paris green or arsenate of lead. This method should be especially available when the insect threatens to attack the topmost growth of the papaya or papaw, which should preferably receive one or other of these in the form of a spray, in anticipation of this event.

Again, it will probably be found that in every district where the insect occurs, and notwithstanding several vegetable products are available as food for the caterpillars at one and the same time, one of these receives marked preference. This experience has led to the growth of special plants, that are styled and that act as "trap crops." Thus maize has been grown to protect cotton, it being the practice to remove it for use as green fodder or ensilage when the caterpillar is still feeding within it, but is not "full-fed." In this instance of the use of a trap crop, it may be objected that, as due to this practice, more caterpillars might be present than would otherwise happen, the parent moth being in this case attracted from the surrounding country by the maize—a plant to which it is very partial.

Again, poisoned baits might be made available, for these put out at night might attract the moth to its destruction; but we have no experimental evidence pointing to the efficacy of this method. Fowler's solution and syrup might be tried in this connection. As already remarked, the moth does not come to light—trap-lanterns, therefore, cannot be employed with any advantage.

The insect, as occurring in Queensland, has, as far as we can ascertain, only one parasite, a small hymenopterous insect. This apparently does not control its increase to any extent. I have been prepared to find that in Southern India, where the *Dichrocis* also occurs, it would have been otherwise, but our local inquiries have not served to throw any light on the question. Amongst birds, several of the honey-eaters assiduously seek and destroy the caterpillars, employing their sharp-pointed beaks in extracting them from places in which they may be ensconced—*e.g.*, amongst the fruitlets constituting the loquat bunch, amid castor-oil capsules, or within the dense heads of millet, &c. The preservation of these feathered friends is, therefore, on this ground especially, a matter of high expedience.

These facts relating to this papaw-loving caterpillar should, when perused by one of Mr. Wise's intelligence, lead to the propounding of methods especially suitable locally for coping with so destructive a pest.

General Notes.

A FLEA-TRAP.

A flea-trap is in general use in Szechuan. It consists of two pieces of bamboo, one inside the other. The outer is about 1 ft. in length, and 2½ in. in diameter; it is longitudinally fenestrated. The inner bamboo is of equal length, but only about 1 in. in diameter. It is kept in position by means of a short wooden plug. The inner bamboo is coated with birdlime or the like; the outer bamboo is protective. The trap can be placed under bedclothes, among rugs, and so forth; any fleas that go through get caught on the birdlime. Dr. Hindle suggests in "Knowledge" that the trap might be of great value in connection with plague epidemics.

Will somebody try this? Bamboos are plentiful in Queensland.

NATIVE BIRDS PROTECTION ACTS.

DESTRUCTION OF NATIVE BIRDS.

Notwithstanding the many insect pests which damage or destroy crops of all descriptions, it seems impossible to impress upon the holiday-maker's mind that, were it not for insectivorous birds, these pests would increase to such an extent as to make the raising of field crops, vegetables, and fruit too expensive a business to be profitable. Even a gun tax, to include the mischievous pea-rifle, would be powerless to protect the birds, in consequence of the practical impossibility of enforcing it in country districts. Whilst the legitimate sportsman carefully observes the close season for game birds, the boy with the pea-rifle is troubled with no conscientious scruples on that score. He looks upon every member of the feathered tribe which comes within reach of his weapon as the legitimate object of his nefarious sport. If the attention of these shooters were directed only towards the fruit or leaf eating birds, no objection could be raised towards their sacrificing thousands of them. Unfortunately, they cannot discriminate between useful and destructive birds; and who is there to teach them? If every State and private school were supplied with well-executed coloured plates of both classes, the teachers would be able to do a great deal towards minimising the evil. We proposed at one time to issue with every Journal one or two such coloured plates, but, unfortunately, these are expensive, and the times have of late been too bad to enable us to carry out the idea. But we shall by no means lose sight of it. Take a few of our insectivorous birds, such as crows, ibis, curlews, owls, night-jars (otherwise moreporks), &c. The crow is generally cunning enough to distinguish between a stick and a gun, and less frequently falls a victim

to the gunner. Crows, although they are notorious for destroying chickens, young birds, hares, &c., yet render signal service to the farmer by destroying mice, cutworms, wireworms, &c. It has been calculated in Germany by Herr Rörig that "a field mouse and its progeny will destroy 1,000 plants of grain whilst the latter are developing." We know what tremendous losses the plague of mice inflicted on farmers last year. He also stated that "About 3,000 crows, by destroying mice and other vermin, benefit farmers to the amount of £2,500 per annum. In other words, what is commonly but erroneously known as the carrion crow benefits him to the amount of 11d. per bird per annum over and above the loss it causes him by the destruction of chickens, eggs," &c. Anyone who has watched the flocks of ibis on newly-ploughed land, thrusting their long curved bills deep into the soil, and devouring thousands of worms, grubs, beetles, and larvæ, must be impressed with the great value of these birds; yet how often are they shot in mere wantonness and left to rot on the ground? The number of mice consumed by owls is something incredible.

In 1905 we were indebted to Mr. Hy. Tryon, Government Entomologist and Vegetable Pathologist, for the following information on the food of various birds. He has closely studied their habits and examined their stomachs. This scientific phase of the question we do not attempt to deal with; the object of this article is to draw attention to the indiscriminate shooting of birds, destructive or useful, for no other purpose but sport, or "to keep one's hand in," as swallow and marten shooters express it:—

INSECTIVOROUS AND PARTLY INSECTIVOROUS BIRDS.

Ibis.—The food of the birds comprised by this name consists of frogs, especially in the tadpole state, grasshoppers, grass-eating caterpillars, ground-frequenting caterpillars, soil-frequenting "grubs" generally, young fish, &c.

Carrion Crow.—No bird in Australia bears this name that may be erroneously bestowed on the common crow or raven, or on the white-eyed crow, both of which possess feeding habits distinct from those of the European "carrion crow." The food of the bird of coastal Queensland, the former of the two kinds mentioned, includes grasshoppers, locusts, cicadas, moths, grass-eating caterpillars, soil-frequenting grubs, and large insects generally. Ticks, rats and mice, eggs of poultry and wild birds, young chickens and ducks (exceptionally); seeds of cereals when broadcasted, plantlets of cereals, maize from the cob (exceptionally), lambs, the eyes of cast ewes and of bogged sheep and cattle; fruit, *e.g.*, pineapples and watermelons; carrion and offal generally.

Pied Crow (Shrike).—Insects of various kinds, especially the larger ones, *e.g.*, grasshoppers, locusts, &c.; seeds, berries of wild and cultivated

trees, coffee berries, fruit generally—oranges, figs, grapes, strawberries, to most kinds of which it is highly destructive; carrion, including dead birds, &c.

Morepork (Ninix).—The smaller kinds feed on various nocturnal insects, on rodents, on small birds, on young domesticated pigeons. The largest kinds the same, and on birds as large as a laughing jackass—*Dacelo sp.* (Brennan).

Night-jar.—On various nocturnal flying insects, and especially on moths.

Laughing Jackass.—On large insects, grasshoppers, locusts, &c., lizards, iguanas (small), snakes, small rodents (rats and mice), chickens, young birds.

Kingfishers (1. *Halcyon*).—Feed on grasshoppers, mantidæ, noctuid caterpillars, lizards (small), tree frogs, spiders, tipulid flies, beetles, white-ants.

Kingfishers (2. *Alcyone*).—Small fish, aquatic insects, flying insects hovering over water.

Butcher Birds (*Cracticus spp.*).—Feed on large insects (grasshoppers, &c.), small lizards and other reptiles, small snakes, caterpillars, soil-frequenting "grubs," small rodents (mice, &c.), nestling birds, small birds both wild and domesticated, very young chickens, hive bees (exceptionally).

Dollar Birds.—Insects (especially beetles) occurring on the wing and in tree-tops; hive bees (exceptionally).

The whole of the State is now under the operation of the Acts, and Queensland is divided into two districts, for which two distinct close seasons are provided. New names have been included in the lists of protected birds. Schedule A contains the names of those totally protected, while in Schedule B will be found those to which partial protection only is afforded. Considering the valuable asset insectivorous birds are to the State, and especially to those people whose occupation is connected with the land, there should be ready assistance given to the Department in the protection of our native birds. It should be noted that any person can prosecute under the Acts.

Reserves can be proclaimed with the consent of the owner or occupier of private lands, and rangers (honorary) appointed when a reserve has been created.

The following particulars—showing the birds which are subject to the operation of the Native Birds Protection Acts, the periods of the year during which the Acts are in operation, and the reserves set apart for the preservation and protection of such birds—are published for general information:—

BIRDS ABSOLUTELY PROTECTED THROUGHOUT QUEENSLAND.

Schedule A.

Common Name.	Technical Designation.
Australian Bee-eaters	Merops
Babblers	Timeliidæ
Bell Birds	Oreoica
Bitterns	Ardeiformes
Black Cockatoos of all species	Calyptorhynchus
Black Swans	Anatidæ
Bower Birds of all species	Ptilonorhynchidæ
Bush Chats of all species	Ephthianurinæ
Cassowaries	Casuariidæ
Caterpillar-eaters	Campophagidæ
Coachwhip Birds	Timeliidæ
Coucals or Swamp Pheasants	Centropodinæ
Cuckoo Shrikes	Campophagidæ
Cuckoos of all species	Cuculidæ
Diamond Birds (Pardalotes)	Dicæidæ
Dollar Birds (Rollers)	Eurystomus
Egrets of all species	Ardeiformes
Fantails	Muscicapidæ
Field Wrens	Timeliidæ
Flower-peckers	Dicæidæ
Fly-catchers (Wagtails)	Muscicapidæ
Fly-eaters	Muscicapidæ
Frogmouths	Podargidæ
Grebes	Podicipediæ
Herons	Ardeiformes
Honey-eaters (except Miners, Wattle Birds, Friar Birds)	Meliphagidæ
Ibises	Ardeiformes
Jabirus	Ardeiformes
Kingfishers (all species)	Alcedinidæ
Kites	Elanus
Land Curlews or Stone Plovers	Œdicnemidæ
Larks of all species	Motacillidæ, Alaudidæ
Laughing Jackasses	Alcedinidæ
Lyre Birds	Menuridæ
Magpies	Gymnorhina
Magpie Larks	Grallina
Martins	Hirundinidæ
Nightjars or Goat-suckers	Caprimulgidæ
Nuthatches or Tree-runners (Woodpeckers)	Sittidæ
Owls	Strigidæ
Parras	Parridæ, Glareolidæ
Parrots (Ground or Swamp)	Pezoporus
Pipits	Motacillidæ, Alaudidæ
Pittas of all species	Pittidæ
Pratincoles	Parridæ, Glareolidæ
Regent Birds	Genus Sericulus (Ptilonorhynchidæ)
Rifle Birds	Paradiseidæ
Robins of all Species	Muscicapidæ
Satin Birds	Genus Ptilonorhynchus (Ptilonorhynchidæ)
Shining Starlings (Calornis)	Eulabetidæ
Shrike Tits	Muscicapidæ
Song Larks	Timeliidæ
Spoonbills	Ardeiformes
Storks	Ardeiformes
Swallows	Hirundinidæ
Swamp Pheasants	Centropodinæ
Swifts	Cypselidæ
Thickheads (Whistlers)	Muscicapidæ
Thrushes of all species	Turdidæ, Prionopidæ
Tit Warblers (Tree Tits)	Sylviidæ
Tree-creepers	Climacteris
Tree-runners	Sittidæ
Warblers	Sylviidæ
White-eyes or Silver-eyes	Zosteropidæ
Wood Swallows	Artamidæ
Wren Warblers	Sylviidæ
Wrens of all species	Sylviidæ

BIRDS PARTIALLY PROTECTED THROUGHOUT QUEENSLAND.

SCHEDULE B.

Common Name.	Technical Designation.
Bronzewing Pigeons	Columbæ
Brown Hawks	Falconidæ
Bustards or Plain Turkeys	Otididæ
Coots	Rallidæ
Cranes	Gruidæ
Crakes	Rallidæ
Curlews	Charadriidæ
Dottrels	Charadriidæ
Doves	Columbæ
Ducks, Wild, of all species	Anatidæ (excepting Black Swans)
Emus	Dromæidæ
Fig Birds	Oriolidæ
Finches (including Plumhead, Banded, Painted, Zebra, and Redheaded Finches, &c.)	Ploceidæ
Geese, Wild	Anatidæ (excepting Black Swans)
Land Rails	Rallidæ
Mallee Fowls	Megapodiidæ
Moor Hens	Rallidæ
Native Companions	Gruidæ
Native Hens	Rallidæ
Orioles	Oriolidæ
Pigeons, all Wild	Columbæ
Plovers	Charadriidæ
Quails	Phasianidæ, Turnicidæ
Rails, Land and Water	Rallidæ
Scrub or Brush Turkeys	Megapodiidæ
Scrub Fowls	Megapodiidæ
Sea Birds, all	
Turkeys, Plain and Scrub or Brush	Otididæ and Megapodiidæ
Waders	Charadriidæ
Water Rails	Rallidæ

Close Seasons.

In District No. 1, from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2, from the first day of November in each year to the thirty-first day of May in the following year, inclusive.

(With the exception of emus on prickly-pear infested lands, where the close season shall be from the first to the seventh day of July in each year.)

For districts, *see* map.

PENALTIES.

If any person shall wilfully kill or destroy any protected native bird, or shall use any instrument whatever, net, or other means for the purpose of killing or destroying any native birds, within the periods hereinbefore mentioned, such person shall, upon conviction, **pay a fine of not less than one pound or more than five pounds.**

If any person shall buy, sell, or knowingly have in his possession, house, or control any native bird at any time within the period hereinbefore mentioned, he shall **pay a penalty not less than one pound or more than five pounds for every bird.**

If any person wilfully kills, destroys, or captures any native bird, or uses any instrument, net, or any other means whatever for the purpose of killing, destroying, or capturing any such bird, while it is within or flying over a reserve, he shall be liable upon conviction to pay a **fine of not less than one pound or more than five pounds.**

A moiety of every penalty recovered under the Act shall be paid to the person or persons laying the information.

LIST OF RESERVES WITHIN WHICH THE DESTRUCTION OF NATIVE BIRDS IS PROHIBITED DURING THE WHOLE YEAR.

Situation of Reserve.	For Proclamation and Boundaries *see Government Gazette.*		
	Date.	Part.	Page.
Parish of Enoggera, county of Stanley (Enoggera Reservoir and Catchment Area)	29 Aug., 1885	II.	769
Parish of Gracemere, county of Livingstone	29 Aug., 1885	II.	769
Parishes of Toorbul, Beerwah, and Bribie, county of Canning (Pumice Stone Channels and the shores thereof)	12 Sep., 1885	II.	897
**Parishes of Crow's Nest and Douglas, counties of Cavendish and Aubigny*	10 Oct., 1885	II.	1253
**Parish of Emu Creek, county of Cavendish*			
**Parish of Douglas, county of Aubigny*			
Parish of Nerang, county of Ward, Southport	5 June, 1886	I.	1946
Parishes of Moggill and Indooroopilly, county of Stanley (Gold Creek and Moggill Creek Drainage Areas)	13 July, 1889	II.	797
Parish of Boonara, county of Mackenzie (on the leased part of Boonara Run)	14 Sep., 1889	III.	99
Parishes of Enoggera and Indooroopilly, county of Stanley (Mount Coot-tha Reserve)	20 Dec., 1890	III.	1403
Parish of Oxley, county of Stanley (Chelmer Recreation and Water Reserve)	4 Mar., 1893	I.	670
Parish of Hewittville, county of Livingstone (Reserve for Water, Emu Park)	18 July, 1893	II.	583
Parish of Ossa, county of Carlisle, Seaforth	1 Jan., 1898	I.	21
Parishes of Cressbrook, Bowman, and Neara, county of Canning	11 June, 1898	I.	1596
Lake Clarendon	24 Mar., 1900	I.	961
England and Clarendon	25 June, 1900	I.	1650
Fitzroy, Nicholson, Faraday, Calioran	6 July, 1901	II.	564
Gavial and Gracemere (The Duck Pond)	13 July, 1901	II.	633
Horseshoe Lagoon, parish of Selkirk	16 Aug., 1902	II.	421
Cloyna	28 Dec., 1901	III.	990
Parishes of Antill and Jarvisfield	30 July, 1904	II.	249
Parish of Jarvisfield (Church Lagoon)			
Ditto (Red Lily Lagoon)			
Parish of Rockhampton (Murray's and Jardine's Lagoons)	27 Aug., 1904	II.	493
Parish of Charters Towers (Burdekin Weir)	29 Oct., 1904	II.	901
Dunk, Kumboola Island, and Mount Islet, the Family Islands (comprising Thorpe, Richards, Wheeler, Coombe, Bowden, Smith, and Hodson Islands), and Brooks Islands	13 May, 1905	I.	1546
Parish of Yeerongpilly (Russell Wilkins)	16 Dec., 1905	II.	1273
Ditto (Water Reserve)			
Parish of Enoggera (Private lands on Toowong Creek)	11 Aug., 1906	II.	274
Parish of Yaamba (P. F. MacDonald's property)	8 Sep., 1906	II.	514
Parish of Noogoon (Mud Island)	8 Dec., 1906	II.	1195
Parish of Broadmere (Lake Murphy	13 Feb., 1909	I.	341
County of Stanley (The Redcliffe Shire)	20 Mar., 1909	I.	738
Parishes of Wyseby and Aubrey (Stud Farm for Breeding Police Horses)	10 July, 1909	II.	70
Parish of Pentland (Pentland Dam and Swamp)	24 July, 1909	II.	220
Parish of Dugandan (A. J. McConnell's property)	4 Sep., 1909	II.	587
County of Nares (The Douglas Shire)	16 April, 1910	I.	1002
County of Elphinstone (Abattoir Reserve, Townsville)	21 May, 1910	I.	1326
Parish of Taylor, Toowoomba District (Jubilee Park), Redwood Park, Picnic Point, and One-tree Hill)	8 Oct., 1910	II.	1010
Parish of Tingalpa (Shire of Wynnum)	18 Feb., 1911	I.	930
Gladstone Land Agent's District (Capricorn Group of Islands)	5 Aug., 1911	II.	422
Mackay Land Agent's District (Orphanage Swamp and Denman's Water Hole)	23 Sep., 1911	II.	820
Parishes of Rockybar and Eumara (Reeves Lake, &c., on Eumara and Gainsford Holdings)	29 June, 1912	I.	1711
Shire of Widgee	20 Dec., 1913	II.	1741
Parish of Stradbroke (Myora)	11 April, 1914	I.	1036
Shire of Maroochy	2 May, 1914	I.	1173
County of Ward, area on coast from Southport to Pt. Danger	4 July, 1914	II.	78

* Note.—These reserves are for the protection of the following birds only:—Tallegallas or Scrub Turkeys, Bronzewing and all Wild Pigeons, Emus, Regent Birds, Quails.

QUEENSLAND
and Territory of
PAPUA
1913

Scale 100 Statute Miles to an Inch

CORAL SEA

GULF OF CARPENTARIA

SOUTH PACIFIC OCEAN

AUSTRALIA

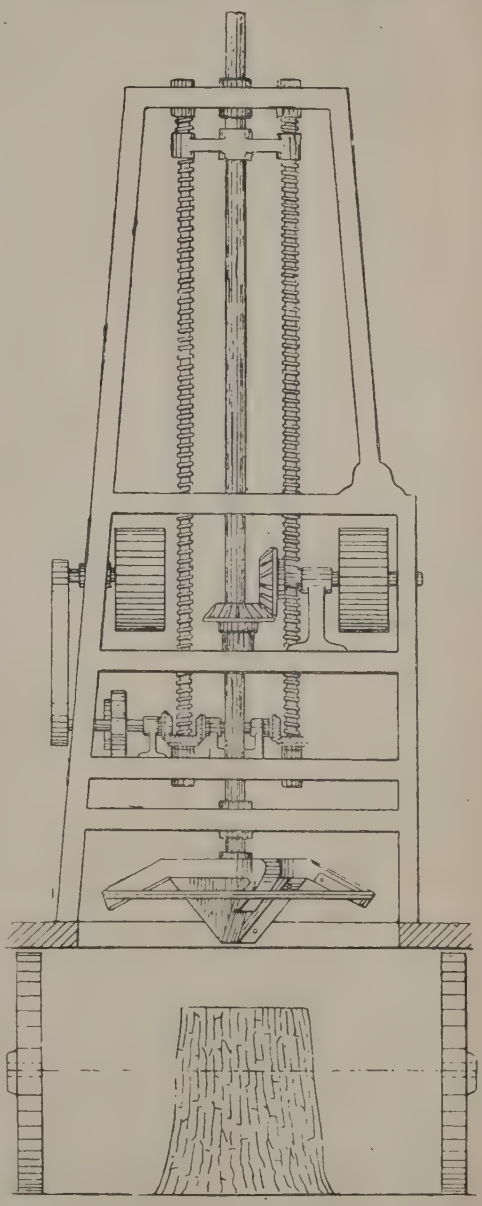
Great Barrier Reef

No. 2 DISTRICT

No. 1 DISTRICT

A STUMP-CUTTING MACHINE.

A machine for cutting down stumps 6 in. and more in diameter has been devised and patented by A. L. and G. D. Moore, of New Orleans. The machine is shown in the accompanying sketch; it is strongly built and can be attached to any tractor. In working, it is propelled to the stump and the cutter head is made to revolve at 400 revolutions per minute. The cutter head is lowered by a friction feed operated by a rocking lever. The thickness of the chips or shavings is regulated by the feed screws.



The cutter can be regulated so as to penetrate 18 in. below the surface of the ground, if necessary, so as to consume all the stump, leaving only the minor roots.

The cutter head is so formed that, with the velocity of working, the chips are thrown upwards by a centrifugal motion. The chips are guided by a hood or jacket and are blown in one direction so that they can be sacked or carted away. The principal object of the machine is to clear cut-over lands from stumps, leaving the land ready for cultivation. At the same time the stumps are cut into small chips which can be used for the manufacture of by-products such as wood pulp.

It is worked by two men, and the cost of the oil fuel is estimated at 3 dollars (12s. 6d.) per day of ten hours.—"Monthly Bulletin."

Answers to Correspondents.

RETARDATION OF THE CHURNING OF CREAM.

E. J. BLENEY, Dingo—

1. Mixing lime with salt for milkers would not prevent the cream from turning into butter.

Amongst the causes which retard the churning of cream, the following are to be listed:—

2. Uneven ripening of the cream prior to churning.

3. Churning cream at abnormally high or low temperatures.

4. Churning cream containing a very low percentage of butter fat.

5. Faults in the mechanism of the churn which, as a consequence, cause the cream to become "whipped" rather than the minute fat globules to be collected, as ordinarily happens during the process of churning cream.

It is impossible to make "whipped" cream give up its butter fat content by churning.

PRUNING FRUIT TREES—PAPAWS.

A. E. OELRICKS, Mount Cotton, asks, on 7th September—

1. I have some citrus trees just coming into bearing for the first time, but they are sadly in need of pruning. Will it hurt the trees to prune them now, with the sap up, of course taking care not to cut blossoms away?

2. My mango trees are just beginning to blossom. Will it hurt them to bleed them now, or must I wait until they have finished fruiting?

3. What are the best papaws to grow? I personally prefer the dwarf kind. Can you tell me the names? Also, I have seen some very large and almost seedless papaws. Can you tell me the name of the variety; also, whether it can be obtained in Brisbane?

Mr. C. ROSS, F.R.H.S., Instructor in Fruit Culture, replies –

1. It is always better to prune while the sap is dormant, but it will not hurt your citrus trees to prune them now. If the blossoms are very numerous, no harm will be done by reducing them; the remaining blooms will set better. Relieve dense growth and prune out all weak inside wood along the branches and trunk.

2. Thin out the wood of your mango trees at once, but do not reduce the blooms too much.

3. The "Cowley" and "New Guinea" are large varieties with few seeds. The dwarf, round variety produces more seeds, but is of excellent flavour. Seeds may be obtained from Brisbane seedsmen, or Mr. Moore, Redland.

My absence from Brisbane will account for any delay which has occurred in replying to your letter.

TREATMENT OF FISTULA IN HORSES.

Jas. Wright, "Mons Visus"——

Blistering is often beneficial at the commencement, but in most cases thorough surgical treatment is necessary before recovery takes place. Why fistulas are so troublesome to treat is because the tubular passages which lead from the surface opening are lined by a false membrane. This membrane must be removed before the wound can permanently heal, and the best way to bring this about is to probe the wound, thus finding out the depth and direction of the tube or tubes; then open boldly with the knife (these tubes) and apply the following lotion on some cotton-wool:—

Corrosive sublimate	½ oz.
Methylated spirit	3 oz.
Water	3 oz.

Apply every third day until the third application. Keep the wound clean, and apply lard or oil to the outside where the discharge runs.

PRICKLY PEAR DESTRUCTION.

T. A. Ricketts, Kinkabilla—

Your letter of 12th instant was submitted to Mr. Brünnich, Agricultural Chemist, who replies as follows to your questions:—

1. Arsenic is the effective ingredient. Caustic soda aids in making the arsenic more readily soluble. Salt is added, as it apparently makes the poison more effective, probably by causing a quicker diffusion through plants.

2. The solution could be kept for any length of time without altering efficacy. The same applies to powder, only this generally cakes and forms hard lumps on being kept.

3. The arsenic itself would kill the plant.

4. Washing soda may be used instead of caustic soda, only larger amounts are necessary, as the arsenic does not dissolve so quickly.

5. No special bulletin for the guidance of selectors has been issued.

DERIVATION OF THE WORD CANADA.

"Curious Historian," Tiaro—

Sir John Barrow derives this name as follows:—When the Portuguese, under Gaspar Cortereal, in 1590, first ascended the great river St. Lawrence, they believed it was the strait of which they were in search, and through which a passage might be discovered into the Indian Sea. But, on arriving at the point whence they could clearly ascertain it was not a strait but a river, they, with all the emphasis of disappointed hopes, exclaimed: "Aca nada!" or "Canada" ("Here there is nothing") words which were remembered and repeated by the natives on seeing Europeans arrive in 1594, who naturally conjectured that the word they heard employed so often must denote the name of the country—Canada.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER, 1914.

Article.		SEPTEMBER. Prices.
Bacon	lb.	8d. to 10½d.
Bran	ton	£6 10s.
Butter	cwt.	112s.
Chaff, Mixed	ton	£3 5s. to £3 10s.
Chaff, Oaten (Victorian)	„	£5 10s. to £5 15s.
Chaff, Lucerne	„	£7
Chaff, Wheaten	„	£4 15s.
Cheese	lb.	7½d. to 8d.
Flour	ton	£9 10s.
Hams	lb.	1s. 1½d.
Hay, Oaten (Victorian)	ton	£6 5s. to £6 10s.
Hay, Lucerne (Prime)	„	£3 5s.
Honey	lb.	2½d. to 3d.
Maize	bush.	3s. 1½d. to 4s.
Oats	„	3s. 7d. to 4s.
Onions	ton	£9 to £10
Peanuts	lb.	3d. to 3¼d.
Pollard	ton	£6 10s.
Potatoes	„	£3 15s. to £6
Potatoes (Sweet)	cwt.	2s. to 2s. 3d.
Pumpkins	ton	£1 15s. to £2
Wheat, Milling	bush.	3s. 6d. to 4s. 9d.
Eggs	doz.	8d. to 1s.
Fowls	pair	3s. to 9s.
Geese	„	7s. to 8s. 6d.
Ducks, English	„	4s. to 5s. 6d.
Ducks, Muscovy	„	4s. 4d. to 7s. 6d.
Turkeys (Hens)	„	9s. to 11s. 6d.
Turkeys (Gobblers)	„	28s.

SOUTHERN FRUIT MARKETS.

Article.	SEPTEMBER. Prices.
Bananas (Queensland), per case	12s., 15s., 18s.
Bananas (Fiji), per case	...
Mandarins (Queensland), per case	10s. to 12s.
Oranges (Navel), per case	12s. to 15s.
Oranges (Seville), per case	6s. to 7s.
Oranges (other), per case	6s. to 9s.
Passion Fruit, per half-case	...
Pineapples, per case	6s. to 8s. 6d.
Pineapples (Queensland), (Queens), per case	...
Pineapples (Ripleys), per case	...
Tomatoes, per quarter-case	4s. to 5s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	SEPTEMBER. Prices.
Apples, Eating (Tasmanian), per case	6s. to 10s.
Apples (Cooking), per case	5s. to 9s.
Bananas (Cavendish), per dozen	2d. to 5d.
Bananas (Sugar), per dozen	1d. to 2½d.
Cape Gooseberries, per quarter-case	5s. to 8s.
Citrons, per cwt.	10s. to 10s. 6d.
Cocoanuts, per sack	12s. to 14s.
Cumquats, per case	1s. 6d. to 2s. 3d.
Custard Apples, per quarter-case	2s. 6d. to 6s.
Lemons (Local), per case	6s. to 8s.
Lemons (Imported), per case	10s. to 20s.
Mandarins, per case	5s. to 9s. 9d.
Oranges (Navel),	6s. to 8s. 6d.
Oranges (other), per case	5s. to 7s.
Papaw Apples, per quarter-case	1s. 6d. to 2s. 6d.
Passion Fruit, per quarter-case	4s. to 6s.
Persimmons, per quarter-case	2s. 6d. to 4s. 6d.
Peanuts, per pound	3½d. to 4d.
Pears, per quarter-case	6s. to 8s.
Pineapples (Ripley), per dozen	1s. 6d. to 2s.
Pineapples (Rough), per dozen	1s. to 1s. 6d.
Pineapples (Smooth), per dozen	2s. to 4s. 6d.
Rosellas, per sugar bag	...
Strawberries, per dozen pint boxes	2s. 6d. to 7s. 6d.
Strawberries, per tray	1s. 6d. to 2s.
Tomatoes, per quarter-case	1s. 9d. to 6s.

TOP PRICES, ENOGGERA YARDS, AUGUST, 1914.

Animal.	AUGUST. Prices.
Bullocks	£16 2s. 6d. to £17 10s.
Cows	£10 5s. to £12 7s. 6d.
Merino Wethers	26s.
Crossbred Wethers	29s.
Merino Ewes	20s. 9d.
Crossbred Ewes	17s. 6d.
Lambs	23s.
Pigs (Baconers)	...
Pigs (Porkers)	43s.

EXHIBITION PRICES.

Animal.	AUGUST. Prices.
Bullocks	£28 15s.
Bullocks (Champion)	£22
Bullocks (Guessing)	£21 10s.
Cows (Champion)	£13 5s.
Cows	£12 15s.
Merino Wethers	27s. 6d.
Crossbred Wethers	29s.
Merino Ewes	21s.
Crossbred Ewes	27s.
Lambs	23s.

Farm and Garden Notes for November.

FIELD.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

KITCHEN GARDEN.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c.; and transplant for succession in calm cloudy weather.

FLOWER GARDEN.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Orchard Notes for November.

THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those gown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where the land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple, Mussel, Circular Black, and Glover Scales. Fruit fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oïdium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

THE TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only

a single layer of fruit, and should be sent in the cool chamber. I am certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of the year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; far too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

THE SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oïdium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oïdium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit fly in the early ripening fruits, and gather and destroy all that may be so affected.